

**FIELD INVESTIGATION SUMMARY REPORT  
MAY AND JUNE 2011  
REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS) OVERSIGHT  
R&H OIL / TROPICANA ENERGY SUPERFUND SITE, SAN ANTONIO, TEXAS**

This Field Investigation Summary Report summarizes activities at the R&H Oil / Tropicana Energy Superfund Site (the Site) between 23 May and 7 June 2011. It includes an introduction followed by discussions of health and safety issues, weather conditions, and site activities, and a list of references.

## **INTRODUCTION**

Under the direction of the U.S. Environmental Protection Agency (EPA), EA Engineering, Science, and Technology, Inc. (EA) oversaw ground water investigatory activities conducted by the Potentially Responsible Parties' consultant, Pastor, Behling, and Wheeler (PBW), at the Site.

Participants included:

- Mr. Chris Villarreal, EPA Task Order Manager
- Mr. Ted Telisak, EA Project Manager
- Ms. Teri McMillan, EA Geologist, Site Manager/Site Health and Safety Officer
- Mr. Duane Thomas, EA Geologist, Site Manager/Site Health and Safety Officer

EA performed field activities in accordance with the following EPA-approved plans:

- RI/FS Oversight Work Plan (EA 2011a)
- Health and Safety Plan (EA 2011b)

This Field Activity Report reports on the following field activities:

- drilling of monitoring wells;
- water sampling from on-site wells.

## **HEALTH AND SAFETY**

EA was excluded from the daily tailgate safety briefings involving other field crews working at the site. EA conducted its own daily health and safety review at the beginning of each work day.

## **WEATHER CONDITIONS**

On 23 through 25 May and 6 and 7 June, high temperatures ranged from 91 to 101 degrees Fahrenheit. Low temperatures ranged from 73 to 77 degrees Fahrenheit. The skies were mostly clear to partly cloudy and there was no precipitation. Winds were generally southerly,

sometimes at speeds of 15 to 20 miles per hour (mph) with gusts around 25 mph and other times at speeds of about 10 mph with gusts to about 17 mph.

## **SITE ACTIVITIES**

The following paragraphs summarize events noted in the field. More details may be found in the daily field reports in Attachment 1, and in the field logs in Attachment 2. Photographs taken at the site may be found in Attachment 3.

### **Well Drilling and Soil Boring**

From 23 May through 25 May 2011, EA witnessed the PBW's soil boring and well installation activities. PBW advanced and lithologically-logged direct-push soil borings. In all but one instance, these borings were advanced to a depth of approximately 25 below ground surface (bgs), with the exception of one of the borings (NMW-2) which was advanced to 30 feet bgs. They eventually plugged each hole by filling it with bentonite and then hydrating the bentonite with potable water. At regular depth intervals at each location, they checked for volatile organic compounds (VOCs) with a photoionization detector. Soil samples were collected from three depth ranges and were sent to the PRP's laboratory to be analyzed for total petroleum hydrocarbons (TPH), VOCs, semi-volatile organic carbons (SVOCs), and the 8 Resource Conservation and Recovery Act (RCRA) metals. At two locations, surface soil samples were collected for geotechnical analysis. Two sets of vapor intrusion samples were also collected. In all of the borings witnessed by EA, with the exception of MW-12, there was evidence of hydrocarbon staining, odor, sheen and/or non-aqueous phase liquids (NAPL) present. EA personnel defined hydrocarbon staining as brown oil staining present on the outside of the core sample and defined NAPL as a liquid sheen of oil present within the pore space of the core.

Geoprobe boring advancement witnessed by EA included the following:

MW-12	MW-17	NMW-3
MW-13	MW-18	NMW-4
MW-14	MW-19	NMW-5
MW-15	NMW-1	
MW-16	NMW-2	

These locations are identified in the PRP Field Sampling Plan (PBW 2010). A figure from that plan may be found in Attachment 4, showing locations of the monitoring wells.

EA also witnessed installation of monitoring wells MW-12, MW-14, and MW-18. These wells were installed using a hollow stem auger drill rig.

Additional well installation was planned for later in the week, after EA left the Site. The PBW planned to develop the new wells the following week and then sample them.

### **Well Sampling**

On 6 June and 7 June 2011, EA witnessed the PBW's ground water sampling event. PBW sampled MW-5 and NMW-3 for NAPL. MW-6 was not sampled for NAPL, due to the inability to collect the necessary volume. NAPL samples were sent to an off-site laboratory for analysis of TPH, VOC, and physical properties.

PBW also sampled ground water from the following wells:

MW-1	MW-5	MW-14
MW-2	MW-6	MW-15
MW-3	MW-12	
MW-4	MW-13	

PBW also measured physical parameters and collected samples for laboratory analysis. Ground water samples were sent off-site for analysis of VOCs, SVOCs, RCRA 8 metals, and TPH.

### **Plan Derivations**

The following are a summary of Field Sampling Plan (PBW 2010) derivations noted by EA personnel during oversight of PBW. Additional information can be found in the Daily Field Reports and Field Logbook (Attachments 1 and 2, respectively).

- Soil samples were taken from 0.5 feet to 4 feet bgs, whereas the Field Sampling Plan states that samples will be taken at a maximum of 1 foot intervals.
- It was noted that the decontamination procedures for inside the geoprobe core barrel were not thorough prior to starting borehole MW-17. It is noted this issue was resolved following comment by EA personnel.
- Completion of monitoring well MW-12 was not completed with the minimum 2 foot sand pack above the filter pack. Completion of MW-14 and MW-18 were completed to specifications.

### **REFERENCES**

EA Engineering Science and Technology, Inc. (EA). 2011a. Remedial Investigation / Feasibility Study Oversight Work Plan. R&H Oil / Tropicana Energy Superfund Site. San Antonio, Bexar County, Texas. April.

EA. 2011b. Health and Safety Plan. R&H Oil / Tropicana Energy Superfund Site. San Antonio, Bexar County, Texas. May.

Pastor, Behling, & Wheeler. 2010. Field Sampling Plan. R&H Oil / Tropicana Energy  
Superfund Site. San Antonio, Bexar County, Texas. September.



**ATTACHMENT 1**  
**DAILY FIELD REPORTS**

DAILY FIELD ACTIVITIES SUMMARY REPORT			
PROJECT NAME: R&H Oil/Tropicana Energy Site, San Antonio, Texas			
Date: 05/23/11	Shift Beginning: 13:30 hours		Shift Ending: 17:30 hours
RAC II Contract No.: EP-W-06-004		Task Order No.: 0074	
EPA Region 6 TOM: Chris Villarreal		Project Manager: Ted Telisak	
Design Manager: N/A		Site Geologist: Teri McMillan	
Design Engineer: N/A		Site Engineer: N/A	
Personnel on site	Name	Affiliation	Reason for being on site
EA:	Teri McMillan	EA	Drilling Oversight
Subcontractors:	---	Vortex	Driller
Other:	Chris Villarreal Chris Moore Tim Nickels Roberta McClure	EPA PBW PBW PBW	Drilling Oversight Environmental Consultant Environmental Consultant Environmental Consultant
Work Performed			
<p>Pastor, Behling &amp; Wheeler, LLC (PBW) is the environmental consultant that is conducting the remedial investigation field activities. EA is providing oversight of field activities on behalf of EPA.</p> <p>Upon our arrival at the site, PBW informed EPA and EA that one monitoring well was installed using a Geoprobe® outfitted with hollow stem augers. Installing the monitoring well using the Geoprobe® was not efficient; therefore, PBW decided it would be more efficient to only advance soil boring at all well locations to lithologically log and collect soil samples for laboratory analysis. A larger drilling rig is scheduled to arrive at the site tomorrow to install the monitoring wells adjacent to the soil borings that were previously advanced.</p> <p>EA oversaw the advancement of four borings (MW-18, MW-14, MW-12 and NMW-1) using a Geoprobe®. All four soil borings were advanced to a total depth of 25 feet bgs. Soil samples were collected in 5 foot long acetate sleeves. PBW logged, collected headspace measurements with a PID every 2 feet, and collected three soil samples from each boring at the following intervals:</p> <p>0-0.5 feet bgs – collected by first clearing the upper 1 to 2 inches of top soil and then samples collected.</p> <p>0.5 – 5 feet bgs – collected a soil sample from this interval based on olfactory and visual observations. It was mentioned to EPA and PBW that the work plan specified that this interval should be from 0.5 to 4 feet bgs. PBW corrected their procedure after NMW-1.</p> <p>5- 25 feet bgs – vadose zone based on highest headspace measurement obtained by using a PID.</p> <p>Soil samples were to be submitted for analysis of TPH, VOCs (Terra Core Method), SVOCs and RCRA 8 Metals.</p> <p>Borehole MW-18 was backfilled with bentonite and hydrated. The remaining boreholes MW-14, MW-12, and NMW-1 were left open and borehole temporarily covered. The water level was to be measured in well MW-14 prior to PBW leaving the site. Due to the tight nature of the soils beneath the site the saturated zone is difficult to discern in the soil samples. The water level was measured in well MW-1 and was approximately 17 feet bgs. PBW stated that the water level had previously been at approximately 14 feet bgs.</p> <p>The location of MW-12 was adjusted in the field due to the presence of bees in the area. In addition, at boring MW-12 the upper two feet of soil was collected for geotechnical analysis, as well as collecting a 1-</p>			

<b>DAILY FIELD ACTIVITIES SUMMARY REPORT</b>
2' sample in an acetate sleeve to be analyzed for a vapor transport package.
Boring NMW-1 had visible oil staining present from approximately 10 feet to 25 feet. PBW indicated that minor staining (oil sheen) was present in the other three borings.
<b>Anticipated Activities for the Following Day</b>
Continue oversight of Geoprobe® and monitoring well installation activities.
<b>Report prepared by (name and date)</b>
Teri McMillan 5/23/11

DAILY FIELD ACTIVITIES SUMMARY REPORT			
PROJECT NAME: R&H Oil/Tropicana Energy Site, San Antonio, Texas			
Date: 05/24/11	Shift Beginning: 8:15 hours		Shift Ending: 18:35 hours
RAC II Contract No.: EP-W-06-004			Task Order No.: 0074
EPA Region 6 TOM: Chris Villarreal			Project Manager: Ted Telisak
Design Manager: N/A			Site Geologist: Teri McMillan
Design Engineer: N/A			Site Engineer: N/A
Personnel on site	Name	Affiliation	Reason for being on site
EA:	Teri McMillan	EA	Drilling Oversight
Subcontractors:	Robert Joiner Cody Clayton Derek Withoff	Vortex	Driller
Other:	Chris Villarreal Marilyn Long Dani Sattman Eric Pastor Chris Moore Tim Nickels Roberta McClure	EPA TCEQ TCEQ PBW PBW PBW PBW	Drilling Oversight Drilling Oversight Drilling Oversight Environmental Consultant Environmental Consultant Environmental Consultant Environmental Consultant
Work Performed			
<p>Pastor, Behling &amp; Wheeler, LLC (PBW) is the environmental consultant that is conducting the remedial investigation field activities. EA is providing oversight of field activities on behalf of EPA.</p> <p>EA oversaw the advancement of nine borings (MW-16, MW-13, NMW-2, MW-15, NMW-3, MW-17, MW-19, NMW-5 and NMW-4) using a Geoprobe®. All nine soil borings, except for boring NMW-2, were advanced to a total depth of 25 feet bgs. NMW-2 was advanced to 30 feet bgs. Soil samples were collected in 5 foot long acetate sleeves. PBW logged continuously, collected headspace measurements with a PID every 2 feet, and collected three soil samples from each boring at the following intervals:</p> <p>0-0.5 feet bgs – collected by first clearing the upper 1 to 2 inches of top soil and then samples collected.</p> <p>0.5 – 4 feet bgs – collected a soil sample from this interval based on olfactory and visual observations.</p> <p>5- 25 feet bgs – vadose zone soil sample based on highest headspace measurement obtained by using a PID. It was noted that many samples were collected from this interval within the saturated zone. PBW decided to collect the sample with the highest headspace measurement from the 5 -25 foot interval regardless of it being in the vadose or saturated zone.</p> <p>Soil samples were to be submitted for analysis of TPH, VOCs (Terra Core Method), SVOCs and RCRA 8 Metals. Boreholes were plugged using bentonite hole plug hydrated.</p> <p>A water level was not measured in borehole MW-14 prior to PBW leaving the site on 23 May 2011. Instead a water level was measured in borehole MW-14 on 24 May 2011, and it was approximately 22 feet bgs.</p> <p>Evidence of hydrocarbon odor was noted in all borings advanced today. Many borings had hydrocarbon staining present. Boring MW-13 located on the northern portion of the site, had significant contamination present, with the upper 7 feet of soil saturated with black wet product. In addition, PBW field staff indicated that NAPL was present when gauging borehole MW-17.</p> <p>At MW-15 a boring was advanced to 5 feet to obtain a soil sample within the acetate liner from 1 to 2 feet</p>			

<b>DAILY FIELD ACTIVITIES SUMMARY REPORT</b>
for analysis of the vapor intrusion package. A 2 foot split spoon with brass sleeves inside was pushed adjacent to well MW-20 (well was installed on 23 May 2011) for additional geotechnical analysis.
<b>Anticipated Activities for the Following Day</b>
Oversight of monitoring well installation activities.
<b>Report prepared by (name and date)</b>
Teri McMillan 5/24/11

DAILY FIELD ACTIVITIES SUMMARY REPORT			
PROJECT NAME: R&H Oil/Tropicana Energy Site, San Antonio, Texas			
Date: 05/25/11	Shift Beginning: 8:00 hours		Shift Ending: 16:20 hours
RAC II Contract No.: EP-W-06-004		Task Order No.: 0074	
EPA Region 6 TOM: Chris Villarreal		Project Manager: Ted Telisak	
Design Manager: N/A		Site Geologist: Teri McMillan	
Design Engineer: N/A		Site Engineer: N/A	
Personnel on site	Name	Affiliation	Reason for being on site
EA:	Teri McMillan	EA	Drilling Oversight
Subcontractors:	Robert Joiner Cody Clayton Derek Withoff	Vortex	Driller
Other:	Chris Villarreal Eric Pastor Chris Moore Tim Nickels Roberta McClure	EPA PBW PBW PBW PBW	Drilling Oversight Environmental Consultant Environmental Consultant Environmental Consultant Environmental Consultant
Work Performed			
<p>Pastor, Behling &amp; Wheeler, LLC (PBW) is the environmental consultant that is conducting the remedial investigation field activities. EA is providing oversight of field activities on behalf of EPA.</p> <p>EA oversaw PBW as they installed three monitoring wells MW-18, MW-14, and MW-12 using a Mobil B61-HDX hollow stem auger drill rig. Monitoring wells were advanced adjacent to their respective Geoprobe® boring locations. The augers outside diameter was approximately 7.5 inch and the inside diameter was 3.25 inches. Clean augers were used to advance each borehole.</p> <p>Borings for MW-18 and MW-14 were advanced to a total depth of approximately 25 feet below ground surface (bgs) and monitoring wells were installed. The total depths of the monitoring wells were approximately 24 to 24.5 feet bgs. The monitoring well consisted of 15 feet of 0.010-inch machine slotted screen and approximately 11 to 11.5 feet of blank riser (with 2 feet above ground surface). A filter pack consisting of 12/20 silica sand was placed from the total depth of the borehole (25 feet bgs) to approximately 8 feet bgs, followed by bentonite hole plug (hydrated) to 3 feet bgs. Cement then was placed from 3 feet bgs to the surface and an above ground shroud was placed over the riser, for an above ground completion.</p> <p>It was noted that they installed something less than the minimum of 2 feet of filter pack above the well screens in wells MW-18 and MW-14. This was corrected for the next well location.</p> <p>The boring for Well MW-12 was advanced to a total depth of 26 feet bgs and a monitoring well set at 25 feet bgs. The monitoring well consisted of 15 feet of 0.010-inch machine slotted screen approximately 12 feet of blank riser (with 2 feet above ground surface). A filter pack consisting of 12/20 silica sand was placed from the total depth of the borehole (26 feet bgs) to 8 feet bgs, followed by bentonite hole plug (hydrated) to 3 feet bgs. Cement then was placed from 3 feet bgs to the surface and an above ground shroud was placed over the riser, for an above ground completion.</p> <p>During the advancement of borehole MW-12 the drill rig had a hydraulic leak. The rig was shut down for repairs. Plastic was placed beneath the rig where the leak occurred and hydraulic oil was cleaned up using adsorbent pads.</p>			
Anticipated Activities for the Following Day			

<b>DAILY FIELD ACTIVITIES SUMMARY REPORT</b>
PBW and driller will continue to install monitoring wells. No oversight will be provided
<b>Report prepared by (name and date)</b>
Teri McMillan 5/25/11

DAILY FIELD ACTIVITIES SUMMARY REPORT			
PROJECT NAME: R&H Oil/Tropicana Energy Site, San Antonio, Texas			
Date: 06/06/11	Shift Beginning: 10:45 hours		Shift Ending: 17:00 hours
RAC II Contract No.: EP-W-06-004		Task Order No.: 0074	
EPA Region 6 TOM: Chris Villarreal		Project Manager: Ted Telisak	
Design Manager: N/A		Site Scientist: Duane Thomas	
Design Engineer: N/A		Site Engineer: N/A	
Personnel on site	Name	Affiliation	Reason for being on site
EA:	Duane Thomas	EA	Ground Water Investigation Oversight
Subcontractors:	N/A		
Other:	Tim Nickels John Brayton	PBW PBW	Environmental Consultant
Work Performed			
<p>Pastor, Behling &amp; Wheeler, LLC (PBW) is the environmental consultant that is conducting the remedial investigation field activities. EA is providing oversight of field activities on behalf of EPA.</p> <p>EA oversaw PBW as they resumed their groundwater sampling investigation, which had begun on Friday afternoon with MW-16 through MW-20 . PBW began the day by collecting LNAPL samples from 2 predetermined wells. One in the northern investigative unit (R&amp;H Oil site) and one to the south. The LNAPL sample was collected via Geopump 2 peristaltic pump. LNAPL sampling began at MW-6. PBW was not able to collect sufficient LNAPL volume to submit for analysis. PBW (Tim Nickles) planned on replacing this sample, if possible, with another LNAPL impacted well in the southern unit. The impacted well in the northern unit that was sampled was NMW-3. PBW was able to obtain an LNAPL sample there with no issues. PBW chose to replace the MW-6 LNAPL sample with impacted well MW-5. NMW-5, initially planned for LNAPL sampling, was not used because it was not sufficiently impacted. MW-5 is in the southern investigative unit (Tropicana Energy site). PBW was able to sample sufficient LNAPL volume from this well. PBW submitted the LNAPL samples to be analyzed for TPH, VOCs, and physical properties.</p> <p>After the LNAPL sampling was completed, PBW began preparations for the groundwater sampling. The method used for groundwater sampling was low flow micro purge via peristaltic pump. Water quality for stabilization was measured using a Horiba water quality meter. The water quality meter was calibrated prior to use. Turbidity was measured with a HACH turbidity meter. Water level and potential drawdown were measured using a KECK water level indicator. Ferrous iron was measured using a portable HACH DR 820 colorimeter. Monitoring wells sampled on this day were MW-15, MW-13 and MW-12. Samples were submitted for VOCs, SVOCs, metals and TPH.</p> <p>PBW's SOP No. 9, page 2, paragraph F states that a plastic apron may be placed around a well before sampling. No such aprons were placed.</p>			
Anticipated Activities for the Following Day			
PBW will continue low flow sampling of on-site monitoring wells. EA will provide oversight.			
Report prepared by (name and date)			
Duane Thomas 06/06/11			



DAILY FIELD ACTIVITIES SUMMARY REPORT			
PROJECT NAME: R&H Oil/Tropicana Energy Site, San Antonio, Texas			
Date: 06/07/11	Shift Beginning: 07:25 hours		Shift Ending: 15:50 hours
RAC II Contract No.: EP-W-06-004		Task Order No.: 0074	
EPA Region 6 TOM: Chris Villarreal		Project Manager: Ted Telisak	
Design Manager: N/A		Site Scientist: Duane Thomas	
Design Engineer: N/A		Site Engineer: N/A	
Personnel on site	Name	Affiliation	Reason for being on site
EA:	Duane Thomas	EA	Ground Water Investigation Oversight
Subcontractors:	N/A		
Other:	John Brayton	PBW	Environmental Consultant
Work Performed			
<p>Pastor, Behling &amp; Wheeler, LLC (PBW) is the environmental consultant that is conducting the remedial investigation field activities. EA is providing oversight of field activities on behalf of EPA.</p> <p>EA oversaw PBW as they continued their groundwater sampling investigation, beginning today with the low flow sampling at MW-14. Water quality for stabilization was measured using a Horiba water quality meter. The turbidity reading from the Horiba water quality meter was cross checked using a portable HACH turbidity meter. The water quality meter was calibrated prior to use. Water level and potential drawdown were measured using a KECK water level indicator. Ferrous iron was measured using a portable HACH DR 820 colorimeter.</p> <p>PBW said that all onsite wells were gauged after the well development was completed on 06/03/11.</p> <p>Monitoring wells sampled on this day were MW-14, MW-4, MW-1, MW-2, MW-6, MW-5 and MW-3. Monitoring well that were sampled and known to contain LNAPL were MW-6, MW-5 and MW-3. NMW-5 and NMW-4 were not sampled, but were gauged on 06/03/11. According to PBW, both of these wells were assumed to be impacted with LNAPL, therefore did not make the sample list. Samples were submitted for VOC's, SVOC's, metals and TPH.</p> <p>PBW's SOP No. 9, page 2, paragraph F states that a plastic apron may be placed around a well before sampling. No such aprons were placed.</p>			
Anticipated Activities for the Following Day			
None. PBW has completed the groundwater investigation activities for this deployment.			
Report prepared by (name and date)			
Duane Thomas 06/07/11			

**ATTACHMENT 2**  
**FIELD LOGBOOK**

1/23, 11 R & H oil Ten (McMillan)  
330- or. - site → signed  
EA-H&S Plan. Chris & Terion's  
They are setting up on  
MW-18

Using Geoprobe rig =  
1335C leaved grass - collecting  
sample from 0-.5' Preserved  
Sodium bisulfate - Sampling  
methanol

Geoprobe rig - using acetate  
liners 5' sleeves

0-5' - Took next sample  
at ~4.5' - Based on factory

5-10' - took PID every 2'  
mw-20 - DTW encountered

~25' - went to 30' to see it.

MW-1 WL - 17'

10-15' can see oil staining

~~10-20~~ as above - Definite HC  
odor.

Covered acetate sleeves to  
await PID measurements  
before sampled.

J. McMillan

5/23/11 R & H Oil

PID reading - < 202 of  
material placed in baggie  
then crumbled & let to sit  
on table.

Then PID meas. taken

PID measurements recorded  
on log forms. High meas.  
put seed at 5'

Saturated interval at ~ 21-22'

141S - MW-18 - Geoprobe complete  
they put hole plug on borehole  
hydrated. They will come back  
and drill adjacent to set well.

1420 - Setting up on MW-14.

They plan to geoprobe all  
locations & then go back and  
set wells.

1425 clearing location at MW-14  
for 0-.5' sample.

1429 - Setting up - PID for headspace  
& dullers.

1430 - commenced drilling/Geoprobe

0-5' acetate out - fat clay

dark gray grading to light gray

5-10 fine sand at ~ 10'  
J. McMillan

5/23/11 R & H Oil MW-143 - 5'

collected 2nd sample 14-4.5'  
Methanol pres. / sodium bisulfate

Duplicate sample collected.

TerraCore - sample kit

1442 10-15' - clay - light gray

Calcite strong HC odor - staining

Possible - they are calling

OS - oil sheen from

15-20' ~ 18' - some discoloration

present - No sheen - they

are being conservative.

20-25' - more moist at ~

20' - softer

gravel at ~ 3.5'

1300 - SO - clearing hole open

to see if water comes in

Screening head space.

PID measurements noted on

dripping log

collected highest PID for Lab

@ 22' samples analyzed

for TPH Tx method, 8260

(VOCs) SVOCs & Metals

RCRA 8 Samples once in

Cooper McMillan



5/23/11 R#H Oil

MW-12 moved - b/c of bee hive  
will take Geotech sample  
from this location 0-5'

1520 - Collect 5 gallon bucket for  
Geotech - 0-2' bgs is as  
deep as they went.

1530 - started Gouppling MW-12

1538 - Sample macerate - sleeve  
sealed w/ Tap on either end  
1-2' sample for vapor  
intrusion vapor transport  
package J & E model input  
parameters.

1543 - collecting 0-5' sample  
prior to probing in a location  
adjacent to vapor transport  
sample at MW-12

0-5' - clay - dark gray - clayey sand  
top 2 feet

5-10' clay - lighter gray  
more sand near 10' - caliche -  
cal. carb. - slight odor HC

1552 - collected sample from 4-5'  
for lab analyses @ 1600  
NO HC odor J. McMillen

5/23/11 ~~RAH~~ R & H Oil

10-15' - Gravel at 14-15'  
otherwise clay - w/ more sand.

15-20' - Gravel continued w/  
fine sand, to 18' -  
wet from 18' feet - where more  
of SC.

Checked Plan - sampler  
states 0-5 to 4' bgs.

Showed this to Chris.  
This is a deviation from  
work plans.

1611 - 20-25 - silty clay wet  
saturated at 20-21'  
742 ppm - highest pid @  
20'

1620 12' 727 ppm - taking  
Vadose sample @ 12'

1630 - place bag hole plug over  
hole MW-12 moved  
to next location

1630 - at 10 MW-1 - Visible  
Surface Oil obtaining  
adjacent to this location  
took picture

J. McMillen

5/23/11 R & H Oil

1635- started geoprobing -

pulled out 1st 5'

Need to get 0-5' sample  
removing vegetation w/  
shovel.

Then collected

sample using <sup>the Terra Core</sup> ~~the~~ sampler

same preservatives as previously  
discussed.

0-5' - fill material w/ Black

clay ~ 4-5' bgs.

1645- Taking sample from ~4' bgs  
<sup>from</sup> ~~from~~ core - terra core.

5-10' - Clay - 5-5.4 - gravel/sand

(Black. grading to lighter  
gray at 10'

10-15- NAPL - oil staining on  
sample. from 10- to 14'

~~seen~~ sandy clay - light gray.

Sand intervals minor ~ 1/2" thick

15-20' Bottom of 20' - wet - NAPL

sandy clay - NAPL - present

throughout - oil stains

20-25- gravel - ~ 23' - Then

Clay - sandy clay <sup>discarded</sup> ~~water~~

J. McMillan

5/23/11 R & H Oil

1706- Finished ~~from~~ NMW-1

Taking PID measurements

PID measurements highest

at 14 - 16 & 20 range

~~all~~ 1040-1109 ppm-

Taking sample at 14' bgs

all cuttings in drum/bucket.

725- cleaning up site:

730- off site

J. McMillan

5/24/11 R# H Oil

8:15 arrived at Site -  
Chris Villanuel arrived  
as well. PWB staff:

Mr. Tim Nichols

Chris Moore

Roberta McClure

Vortex has Geoprobe

35 MW-16 setting up on

340 took 0.-0.5' sample.

Removed vegetation w/ shovel

then - took sample VOCs

Terra core - 3 TPH, Metals  
SVOCs.

8:41 - Moving geoprobe Rig in  
place.

Talked to Tim w/ PWB

they are only doing geoprobes

today - will then be doing

on another 2 geoprobes

complete to set wells.

\*43 - Began geoprobing  
MW-16.

Vortex decons Geoprobe

inside of Rod & ends

J. McMiller

5/24/11 R# H Oil

8:47 - 0-5' - fill & clayey sand  
then black clay - Fat clay  
collecting sample ~ 4'  
from MW-16

5-10' - Clay - gray  
m - Ca carb near 10'

~~10-20'~~ - sandy clay -  
light gray HC odor

900 TCE on site

Dan Solar Sattman

Marilyn Long

They are covering up

Samples w/ acetate to prevent

Volatilization

15-20' - light gray cl

Sandy clay - more moisture

Wet at ~ 18' gravel at base

Clayey sand at ~ 17.5-18.2

Cleaning out side of

Geoprobe Rods - w/ Alcon

& Water Ring -

HC odor strong - see

discolored water - oil

discoloration

J. McMiller



5/24/11 R#H Oil

20-25- Saturated - See  
product - took picture.  
gravel - then clay samples  
~~took~~ - PID readings - of  
taken Product on out side ~~along~~ core

Put in plastic baggies  
used a knife to collect at  
2' intervals crumble

sample in bag. - Same as  
yesterday. PID calibrated

100 ppb ~~probutene~~

Same w/ air monitor PID

placed at Geoprobe

15 Taking PID Measurements  
Reading & written on  
boring log.

PID measurements 524.5

highest at 24 ft. - taking  
sample for lab.

22- Hole plug Bentonite  
down borehole - used  
5' pipe to make sure it  
goes in 1- 50 lb bag

then hydrated w/ water

J. M. Muller

5/24/11 R#H Oil

Adding another bag Bentonite  
hole plug

Hole plug & 2' bags.

9:25 Setting up on MW-13

9:34 - Removing upper soil  
# veg. to obtain the

0 - 0.5' sample - as they  
have done at previous  
locations - Samples  
placed on ice in cooler.

942 Mr. Foster arrived  
at the site. Eric Foster

0-5 ft - Black - stained  
Product - wet - 3 ft. to 5'  
Silty clay.

950 collected sample from  
3-4' for lab

Collecting duplicate  
Decomposing unadorned Rods

5-10' - black saturated  
w/ oil - HC? - 7'

Then gray clay

10-15' - light gray clay  
Silty clay

J. M. Muller



5/24/11 R & H Oil

Measured water level on  
14-MW-7843 @ 22 ft bgs

15-20' - Clay - sandy clay

20-25' - NAPL - oil - brown

stained ~ 23' - 24'

Clay - <sup>sandy</sup> silty clay

under gravel clay - ~2.5' bgs

gravel 1/4" or less -

Checked to see if there  
was water in borehole

- NO water yet.

1015 - PID measurements

every 2 ft - 5

9.8 ppm ~ 4 ft bgs. This

is from black waste oil  
entered

Highest PID was at

9.58.9 @ 12.3 bgs -

collected sample for lab

from this point

Deconning equipment

used for ~~see~~ taking PID

samples - Ruvio -

1035 - Set up on 14-MW-2

J. McMillan

5/24/11 R & H Oil

collecting surface samples

0-0.5' - scraped surface

collected sample

- Deconning outside of

Reds as well as inside

TM -

0-5' - clay - fat clay gray

with black oil staining

1046 collecting sample for

lab 2-3' closer to 3 -

Duplicate collected.

5-10' - Clay gray - light

10-15 - clay - more sand - undisturbed

15-20' See below

PWB keeping log of headspace

measurements by dilution

Geoprobe was 7822 BT

15-20' mottled gray & yellowish

brown (pale yellow)

Softer - clay, silty clay

20-25' sandy clay -

Sand intervals less than 5"

1110 - They are going 5' deeper

J. McMillan

5/24/11 R & H Oil

1116 measuring headspace of samples

highest measurements from 10-15' bgs & 20' bgs

highest at 20 - 604.7 ppmv

collected soil sample 17-20 for lab

25-30 - more moisture present  
Sandy clay - more etc sand present than above  
Gravelly ~~ss~~ clay - clay soft.  
Gravel ~ 28'

1130 - Deconning - Rods

1145 - off site Lunch

1300 Back on-site

1305 measured DTW on NMW-2 borehole ~ 18' bgs

Bentonite Hole plug placed in borehole & hydrated

check for water in MW-13

- NO water. will check again

1316 - Setting up on MW-15

Scraping veg & dirt

Collected 0-0.5' bgs soil

J. McMillan

5/24/11 R & H Oil

Sample

Geotech sample - limited to surface - plus will collect core in acetate as did

previously

1325 - placing hole plug in ~~MW-13~~ MW-14

0-5' Fill ~ surface

Black Clay - appears stained then gray clay ch - 1.5 - 5' staining at 2'

5-10' - silty clay gray lighter w/depth - more sand/calc. w/depth.  
FM

1342 - collecting sample from 2-3' for lab analysis

10-15' - sandy clay - more sand lenses

15-20 - sandy clay - w/ gravel clay intervals

black oil stains - picture

20-25' - wet - ~ 21' right below gravel

gravel/sand to 21 - then at base gravel clay. J. McMillan

5/24/11 R#H Oil

PID measurements taken  
High readings over 100 ppmv  
from 5-18' bgs  
14' bgs 779.4 ppmv  
Soil sample collected  
for lab.

~~1422~~

1415 Marilyn & Dani  
left the site (TCEQ)

1422 Setting up on NMW-3  
collected surface sample  
0-5' Fill material

Fat clay 3.5-5' gray dark.  
5-10' Clay grading lighter -  
Silty clay 8-10' Slight H color

10-15 H color Sandy clay

Carbon ca nodules & 1" 2" section  
w/sand at 10.5'. gran mottled  
w/ Dark gray - gasoline color

possible staining at ~15'  
5-20' Sandy Clay - light gray / tan  
mottling ~18'-20' -

appeared to be product  
gasoline color visible by wet  
possible NAPL  
J. McPherson

5/24/11 R#H Oil

1440 - collecting 2nd sample  
3-4' bgs - MSMSD samples

20-25' - Clay - gravel clay  
moist

1456 - taking PID measurements  
measure WL - no water yet.

in NMW-3

PID measurements Above - 100 ppmv

starting at 5' bgs.

Highest measurement at 20'

1039 ppmv. taking 3rd  
sample for laboratory at  
this location. SAME analysis  
as others.

1500 putting hole plug in  
bearing MW-15.

SID moving to MW-17

Setting up

Taking 0-0.5' sample  
for lab.

1525 started geoprobe  
MW-17 - Not

Decomming inside  
of Geoprobe Rod

J. McPherson



5/24/11 R & H Oil

Before acetate liner installed  
and cleaning ends.

0-5' Fat clay 3-5' gray  
Fill material above.

Now decomming better.

5-10' Clay ~ 4' - then silty <sup>HC</sup> clay  
Clay with Ca carb nodules <sup>odor</sup>

1531 collecting Lab sample  
from ~ 4' interval  
3.5-4'

10-15' silty clay, staining ~ 12' HC odor  
Ca carb nodules, minor sand lenses

collecting PID samples <sup>HC stains</sup>

every 2 ft. placing them  
in plastic baggies labeled  
as previously done.

15-20' ~ 17.5' - HC stain ~  
1" in length - various smaller  
stains also observed.

Sheen observed.

20-25' gravel - 21' - then  
Clay to 25' -

Water - 20-21' <sup>big</sup> NAPL  
was observed as well?

J. McMillan

5/24/11 K & N Oil

1555. taking PID measurements

PID high (Above 100 ppm)

starting at 15-22' bgs

Highest PID at 22' with

PID of 1092 ppmv.

collecting soil sample  
from ~ 22' bgs for  
Lab analysis.

1600 - Putting hole plug

Bentonite hydrated

in borehole MW-17

1608 Setting up on MW-19

1614 - Took surface sample

- First removed Veg. & top soil

Then collected Lab 0-0.5'

1616 started geoprobeing  
MW-19.

Decomming Rods -

0-5' Clay ~ 2.5' fill above

drier than other boreholes

5-10' - clay - mottled light & dark

gray - 9' - then light

gray clay w Ca carb nodules.

10-15' light clay w above w/ Ca carb nodules

J. McMillan

5/24/11 R4H Oil

1626 collected 2nd Lab

Sample from ~3-4' bgs.

15-20' Sandy clay w/ sand lenses

Wet on sand lenses - HC odor

Collecting samples for PID as before - every 2' - in baggies

Crumbling sample in baggie

Gravel/clay chom @ 18-20'

Sheen observed. possibly

gray discoloration - water present

20-25' - Wet - clay w/ gravel

~23' bgs - then clay silty clay

hole plug in TM

Taking PID readings

PID measurement high > 100 ppm

from 16-20' 16' interval

highest PID at 990.5.

Taking sample for lab at 15-16' bgs.

Hole plug - hydrated in borehole MW-19.

1655 - getting Geotech - Brass

Sleeves - adjacent to

MW-20. Used spet

- M. Miller

5/24/11 R4H Oil

Spoon - 0-2' sample.

Set upon MW-5 - getting

7030 - 0.5' sample for lab

Scraped surface then took

Samples AS did at previous location

Robert Turner Duller

Cody Clayton Helper

Deek Withoff - was not

here on 5/23/11. Helper

Duller on-site

Working for Vortex.

Chris & Eric Pastor are trying to find MW-5.

LCI meter not operating

properly -

7/5 - taking 2nd Lab sample

3-4' -

0-5' - Fill & Clay CH - TM 4-5'

5-10' - Clay - silty clay

They are collecting soil

Samples for PID meas.

every 2' bgs - as previously

done in other borings

10-15' Clay w/ Co. Co. nodules.

J. McMiller

5/24/11 R & H Drilling  
light gray to 17' bgs.  
Then clay is more tan w/  
gray mottling w/ more sand  
minor staining possible

5-20' minor gravel at 17.5-  
1' in length. - clay

Decomming Rods as they  
take them out.

Decomming knives - w/  
Alconox - then water  
rinse - Air dry

20-25' gravel and sand to 24.5  
interval - most sand that  
I have seen in any borehole  
wat. 24.5. Clay is present  
ADBing Bentonite Hole plug  
to borehole.

Staining at surf. 20'  
PID Screening Samples  
Highest PID 20' 107.0  
and 24' - 172.3.

collecting sample at 19-20' bgs  
They know it is in  
saturated zone - but high  
measurement.

J. M. Muller

5/24/11 R & H Oil

Sample submitted to  
Lab. ~~as~~ collected as  
previous samples were.  
All IDW stored in drums.  
Cuttings placed in 5 gal  
bucket then transported  
to 55 gal. drum in  
IDW storage area.

All IDW - water (from decon)  
placed in 55 gal drums  
in IDW storage area.

Decomming knives used  
to cut samples for PID &

Scrape surface of core  
w/ Alconox - DI Rinse

& air dry. This was done for each hole.

1748 - Setting up on NMW-4.  
with in berm area where  
Release of ~8000 gal gasoline  
occurred.

1755 Removed vegetation &  
surface soil w/ shovel.  
then collected 0-0.5'  
Soil sample for Lab.

J. M. Muller



5/24/11 J. M. Millan

Collected the same as  
other samples for  
same analysis.

1757 - Began geoprobing  
NMW 54.

0-5' - fill - ~4' - then cl clay  
gray

Collecting soil sample for  
PID measurement as done  
before using same technique  
previously described.

1803 collected soil sample  
for Lab (2nd sample) from  
~4' bgs. using method  
previously described.

5-10' - visible oil staining  
from ~4' to 10'

Clay: gray

10-15' Clay mottled w/ dark gray  
light gray. Ca Carb nodules

1/2' - light gray w/ Ca Carb  
nodules to 15' possible

staining

15-20' Silty clay as above soft  
near 20' staining as  
J. M. Millan

5/24/11 R & H Oil

20-25' clay w/ minor  
gravel gravel layer from  
~2.5-3' then more gravel  
with clay 24-25'

1820 - Hole plug in borehole  
Hole plug hydrated.

Measuring headspace w/  
PID - PID measurements

above 100 ppmv - 8' bgs.

10' back down 21.9 then high at

14' 1046 ppmv - highest

measurement.

1825 collected soil sample  
from 13-14' bgs for lab  
analysis - used  
protocol for sampling as  
noted before.

1835 - off site

J. M. Millan

5/25/11 R#H Oil

8:00 arrived at site

Duller and PWB on-site

Signed SAHES Plan

as I did for past 2 days

8:15 Chris Villarreal

Arrived on-site

8:30 HSA Rig - B61-HDX

OD - 7.8 Mobile Drill

ID 3 1/4

Vortex setting up on MW-18. - to install well. Set up adjacent to Geoprobe boring. Placing wood plug in bottom of augers.

Chris talked to Tim w/ PWB. He plans on screening each well from 10'-25'.

Screen 10 slot sand 12/20 silica

Drill cuttings are being placed in 55 gal  
J. M. Millan

5/25/11 R#H Oil

drum.

9:50 Talked to Tim w/

PWB. all wells will be screened 10 slot = 12/20 silica sand.

Some wells may be screened to 30'. They need to steel check some boreholes that were left open to see if water came in overnight. They will decide TD based on this. Checking breathing zone with PID at Drill

Rig

9:06 Reached TD of 25'

Knocking bottom plug from bottom of augers. Placed casing in augers down hole.

Using tag line to measure in annulus space. Adding sand. Then

Pulling out augers slowly  
J. M. Millan



5/05/11 R&H Owl

920 Alarm on PAD  
every time put sand  
in. - Not sustained  
for more than 1 minute.  
Will monitor closely.  
Top of sand 8' bgs  
Adding bentonite hole  
plug - hydrating  $\frac{3}{8}$   
Top of bentonite at 3'3"  
bgs. Then concrete for  
pad 3 - surface.  
Stick up well completions  
Well is ~ 1 foot above  
surface so TD ~ 24' bgs.  
Brought out PBW's H&S  
plan - to look over  
then specs for Level C.  
Just states the 1 ppm  
sustained. They have  
Meter set for 50 Alarm  
- will check closely to  
see if at 1 ppm - and then  
see if sustained for 60 sec.  
- M. Miller

5/25/11 R&H owl

945 - Discussed hole plug  
to surface or ~ 3' of  
surface w/ PBW.  
They are doing this instead  
of grout - wells shallow  
so hole plug to 3'.

This is appropriate

947 Mixing cement.

Asked Question regarding  
sand pack for MW-13

Asked if they thought it  
was appropriate since  
gross contamination present  
to approx 7' bgs.

Tim is thinking about it.

950 Putting cement down  
hole & installing shield.

1000 Moving to next location  
MW-14

1010 - Talked to Tim -

asked if he was going  
to have them drill back  
through hole plug -  
He said no adjacent to it  
S.M. Miller

5/25/11 R#H Od

Rig is set up to drill directly over it.

Turn directed them to move Rig.

1020 started drilling MW-14.

All cuttings going in 55 gallon drums.

This area also decommissioning the augers.

Turn with PBW is monitoring air space with PID.

1040 - pushed wood plug from bottom of hole - Not much water on tool.

Put in casing 25' 15' screen 10 slot

Adding filter pack 12/20 silica sand.

Monitoring breathing zone closely

1100<sup>Pull</sup> Pulled augers out.

S. McMiller

5/25/11 R#H Od

- Adding sand filter pack to Annulus Space. - Annulus stays open.

- Well at ~ 24.5' bgs.

SAND at 8' bgs

Top of Screen is at 9.5' bgs ~ 1.5' of

Sand above screen.

1109 - ~~SAD~~ Adding Bentonite hole plug hydrating as go → Bentonite top of 3' bgs.

Loading up augers.

Will go down augers from first three holes.

Will continue drilling with clean augers on Rig.

Mixing cement well

Set Shroud at MW-14.

1130 - Setting up on MW-12

Geoprobe borehole was

Never plugged w/ Bentonite.

Hole plugging Borehole now

S. McMiller

5/25/11 R&H Oil

Discussed the duration  
of min. of 2' sand pack  
above filter pack with Chris.  
He was fine with slight  
duration.

Drilling New bag hole  
~ adjacent to hole that  
was hole plugged.

1140 - started drilling MW-12

Drilled to 5' then are  
taking a geotech. sample  
w/ brass sleeves inside  
split spoon.

1155 started drilling again  
Also began decon of  
75' of augers - took  
picture

1201 - Leak on Reg  
hydraulic line.

Put plastic below rig  
to catch oil. Will have  
to replace line.

1210 - offsite for lunch

J. M. Miller

5/25/11 R&H Oil

1315 - Back on site

Discussed with Tom  
about Sand pack ~~op~~  
placed min 2' above  
Screen. He will correct  
this on next wells.

1350 Drillers Repairing rig  
Tom stated sampling of  
all MW's - regardless  
of NAPL present or not.  
No gw samples will  
be collected from  
any MW's.

1400 Drilling again at  
MW-12.

Got more sand and  
gravel in this well.

Got cuttings ~ 20'.  
They are going to drill to  
approx 30' to accommodate  
plug in bottom of drill bit.  
that is pushed out.

1442 - pushing plug from  
bottom drill bit out

J. M. Miller



5/25/11 R4H Oil

15' screen 10 slot

10' Blank casing

well at 25' bgs. &

adding filter pack

12/20 silica sand. Placing

concrete lifts w/ tag line

Then pulling auger up

slowly.

Sand top of at 8' bgs.

1516 - Adding Bentonite

Hole plugs hydrating

as they go.

Hole plug top of at 3' bgs.

1616 - Drillers setting

up on next well well

only go 5' today

1620 - off site

*[Signature]*

5/25/11 R4H Oil

15' screen 10 slot  
10' Blank casing  
well at 25' bgs. &  
adding filter pack  
12/20 silica sand. Placing  
casing in lifts w/ tag line  
then pulling augers up  
slowly.

Sand top of at 8' bgs.

1516 - Adding Bentonite  
hole plugs hydrating  
as they go.

Hole plug top of at 3' bgs.

1616 - Driller setting  
up on next well well

only go 5' today

1620 - off site

*[Signature]*

San Antonio, TX R4H O.I.

05/25/11

Duane Thomas Onsite

0645 Depart Houston

1007 Arrive onsite

Weather: Hot, mostly sunny, high near  
99°F. Wind 15kt from  
S.

PLAN FOR THE DAY: Begin oversight of  
PRP contractor PBW's groundwater  
investigation via low flow sampling

1010 PBW not onsite

1045 BUB onsite

PBW STAFF: Tim Nickles

EA: Duane Thomas

1100 Tim Nickles waiting on John Brayton  
(field sampler) to arrive onsite ~~prior to~~ before sampling begins.

1128 John Brayton (PBW) onsite

1130 - 1140 load up and prep

1140 John Brayton says PBW will attempt  
to grab a NAPL sample prior to low  
flow sampling

1148 No to MWT for LNAPL sample  
- NAPL obtained using Geopump peristaltic  
pump

San Antonio, TX R+H O.I.

06/06/11

1205 ~ 20ml total LNAPL recovered  
1206 Mob to MW-3 for LNAPL sample.

- good LNAPL recovery

1231 LNAPL sample for NMW-3 complete

1238 Mob to MW-5 for LNAPL sampling

\* Photo: LNAPL sampling

1258 End LNAPL samples

- good recovery for LNAPL

1300 Begin load up for low flow sampling

1325 Mob to MW-15

\* Water quality meter; Florida

Calibrated: 06/06/11

Pump on: 1330

- draw down was measured KECK water level indicator

1346 Per Tim Nickles, MW-6 samples

discarded. (LNAPL SAMPLES) due

to poor recovery/ LNAPL samples

came from NMW-3 and MW-5

1430 Sample time MW-15

Sample Swat: VOC'S, metals, SVOC'S

MS, TPH

\* Ferrous Iron being field tested HACH DR220

San Antonio, TX

R+H O.I.

06/06/11

colorimeter

1423 Sampling ended

1438 Begin set up on MW-13

\* Photo set up on MW-13

- PBW experiencing draw down, J.B. lowers tubing

SAMPLE TIME MW-13 1530

1535 Sampling complete

1540 Mob to MW-12

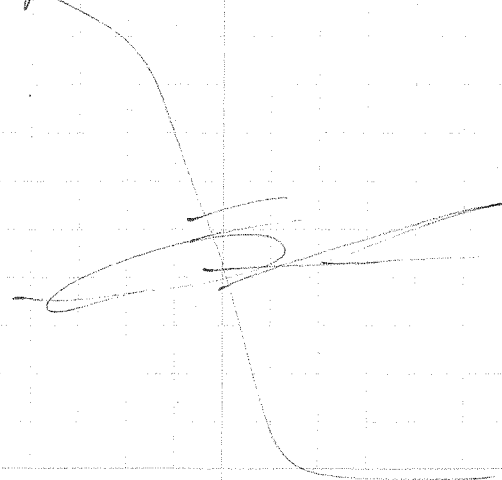
1550 Begin set up on MW-12

1553, Pump on

\* Photo: Sampling of MW-12

1630 Sample time MW-12

1645 MOB report site





San Antonio, TX R&amp;HO:1

06/07/11

0700 Depart SA for site

0725 Arrive on site

WEATHER: Mostly sunny, hot and humid.  
New record highs of 99°F. Winds  
light from South

PLAN FOR THE DAY: Continue oversight of  
PRP contractor PBW groundwater  
sampling event

0735 Mob to MW-14 to begin day's  
investigation

- Field instruments calibrated

0742 Pump on

\* Photo: sampling of MW-14

0830 SAMPLE TIME MW-14 (Dyp taken)

0844 sampling MW-14 complete

0845 Mob to MW-4

0855 Pump On

0855 ~~0900~~ 0900 Method and materials unchanged  
from yesterday use 09/11.

EPA Staff: Dage Thomas

PBW Staff: John Branton

0930 MW-4 SAMPLE TIME

0941 MW-4 Sample completed.

0944 Mob to MW-1

San Antonio, TX R&amp;HO:1

06/07/11

0945 Begin set up on MW-1

1020 SAMPLE TIME MW-1

\* Photo: Set up on MW-1

1030 MW-1 Sampling complete

1035 Mob to MW-2

1036 Begin Set up on MW-2

Pump On

\* Photo: sampling of MW-2

- 10MW5 developed 06/07/11 gassed after development  
on 06/03/11

- Turbidity being measured on Floridan water  
quality meter and double checked with  
HACH turbidity meter.

1121 Sampling at MW-2 complete

1130-1220 Lunch Break

1224 Mob to MW-6

1225 Begin set up on MW-6 (LNAPL impacted  
well) (0.02')

1230 Pump on

- MS/MSD taken here

1315 Sample Time MW-6

1348 Sample Complete

1349 Mob to MW-5 (LNAPL) impacted  
well

San Antonio TX Re-H Oil  
 MW-5 (NAPL Thickness 0.05"  
 (6 well) 06/07/11

1440 Pump on

\* Photo: sampling set up on MW-5 07/07/11

1430 MW-05 SAMPLE TIME

1436 MW-05 sampling complete

1437 MCB to MW-3 (NAPL impacted well) NAPL Thickness: 18.95-19.24

1445 Begin set up on MW-3

1448 Pump on

\* Photo Sampling of MW-3

1530 SAMPLE TIME for MW-3

1535 Sampling complete for MW-3

1550 Depart Site

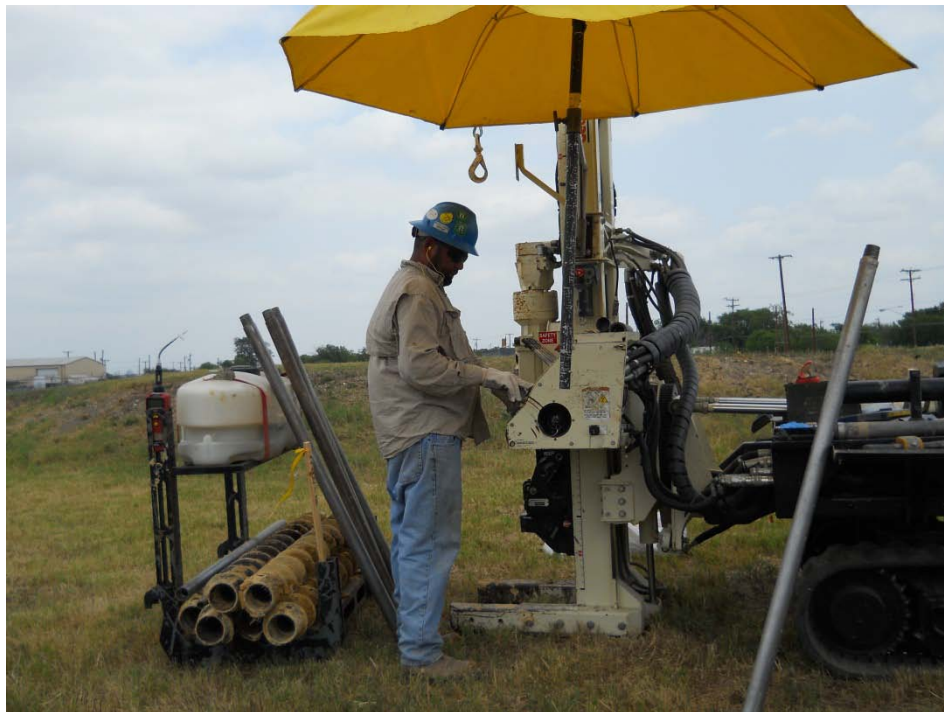


**ATTACHMENT 3**  
**PHOTOGRAPHS**



Photograph No. 1

Description: MW-18. Collecting surface samples.



Photograph No. 2

Description: MW-18. Geoprobng.



Photograph No. 3

Description: MW-18. Core 0-5'.



Photograph No. 4

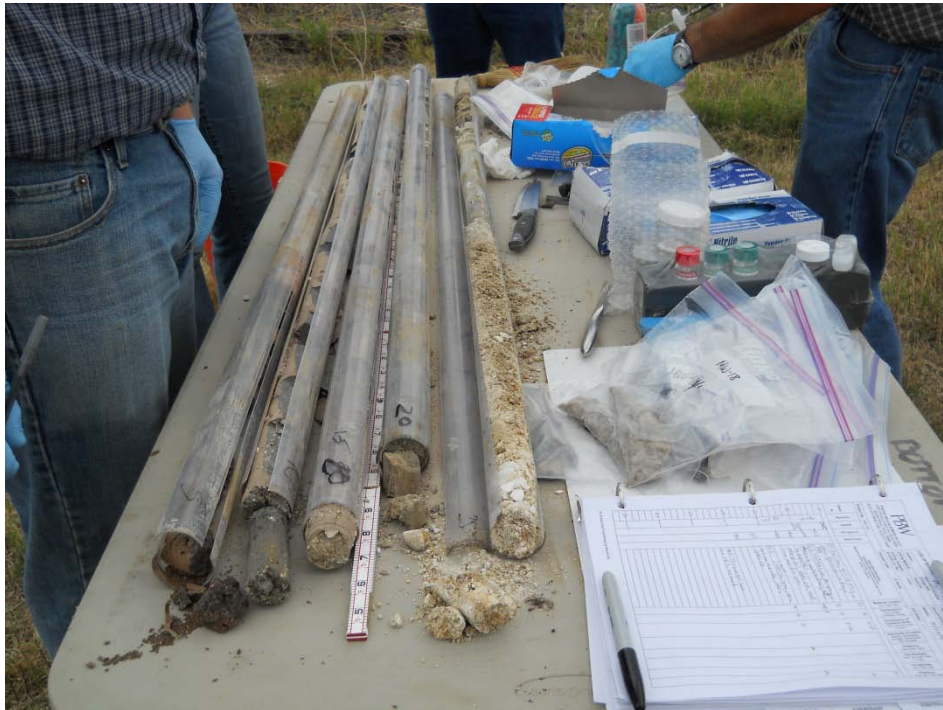
Description: MW-18. Core 0-5' and 5-10'.





Photograph No. 5

Description: MW-18. Core staining 10-15'.



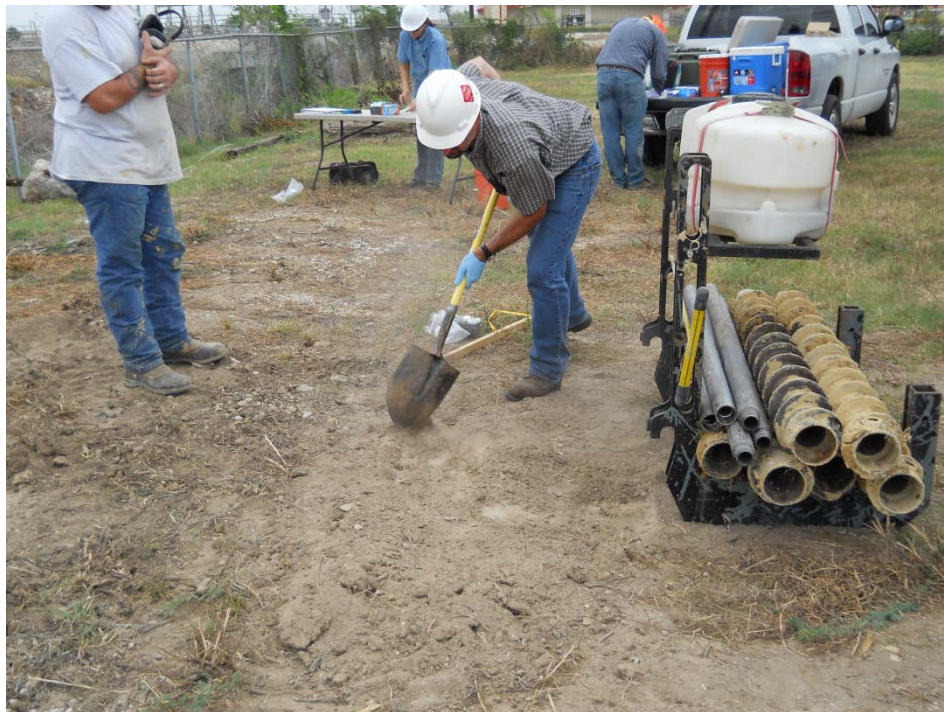
Photograph No. 6

Description: MW-18. Core with acetate liners to prevent volatilization.



Photograph No. 7

Description: MW-18. Labeling of core.



Photograph No. 8

Description: MW-14. Cleaning surface prior to sample collection.





Photograph No. 9  
Description: MW-14. Geoprobings.



Photograph No. 10  
Description: MW-14. Terra core sampling from 0-5'.



Photograph No. 11

Description: MW-14. PBW logging core.



Photograph No. 12

Description: MW-14. Gravel in 20-25' interval.





Photograph No. 13

Description: MW-14. Taking PID measurements.



Photograph No. 14

Description: MW-14. Hole plug bag placed over borehole. Borehole left open to gauge water level.





Photograph No. 15

Description: MW-12. Sample collection for geotechnical analysis.



Photograph No. 16

Description: MW-12. Geoprobings.





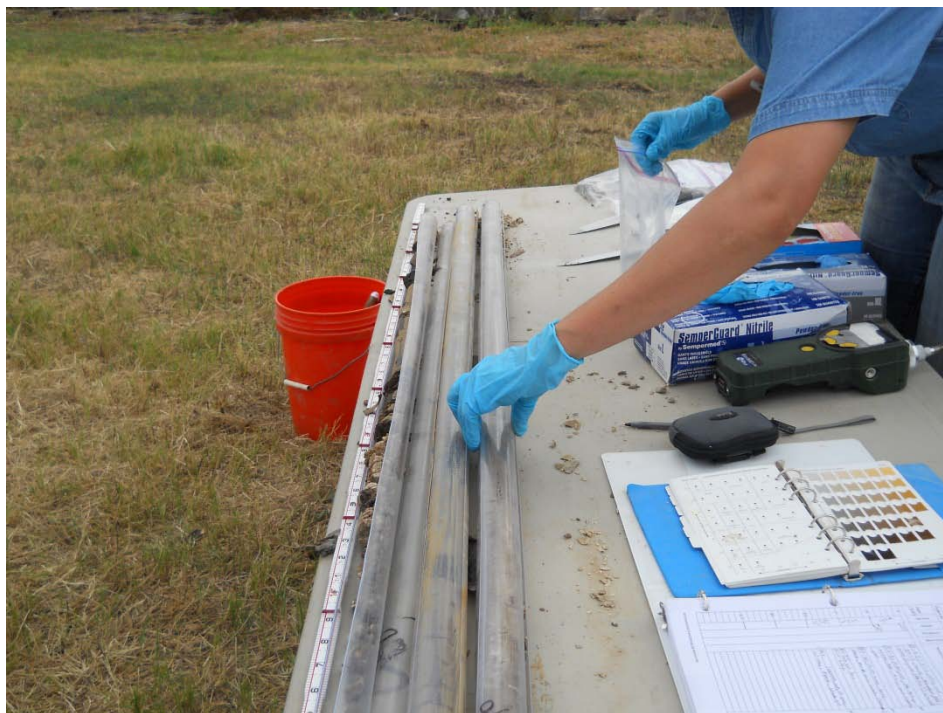
Photograph No. 17

Description: MW-12. Vapor intrusion, vapor transport package in 1-2' acetate liner.



Photograph No. 18

Description: MW-12. Geoprobings.



Photograph No. 19

Description: MW-12. Core covered with acetate liner to prevent volatilization.



Photograph No. 20

Description: MW-12. Gravel in 10-15' interval.





Photograph No. 21

Description: MW-12. Moisture from 15-18', wet from 18-20'.



Photograph No. 22

Description: MW-12. Taking PID readings.



Photograph No. 23

Description: MW-12. Borehole covered with hole plug.



Photograph No. 24

Description: NMW-1. Geoprobe setup.





Photograph No. 25

Description: MW-14.



Photograph No. 26

Description: MW-12.





Photograph No. 27

Description: NMW-1. Stake.



Photograph No. 28

Description: NMW-1. Surface staining.





Photograph No. 29

Description: NMW-1. Surface staining.



Photograph No. 30

Description: NMW-1. Setting up geoprobe and surface staining.





Photograph No. 31

Description: NMW-1. Surface cleared for sampling.



Photograph No. 32

Description: NMW-1. Surface sampling.





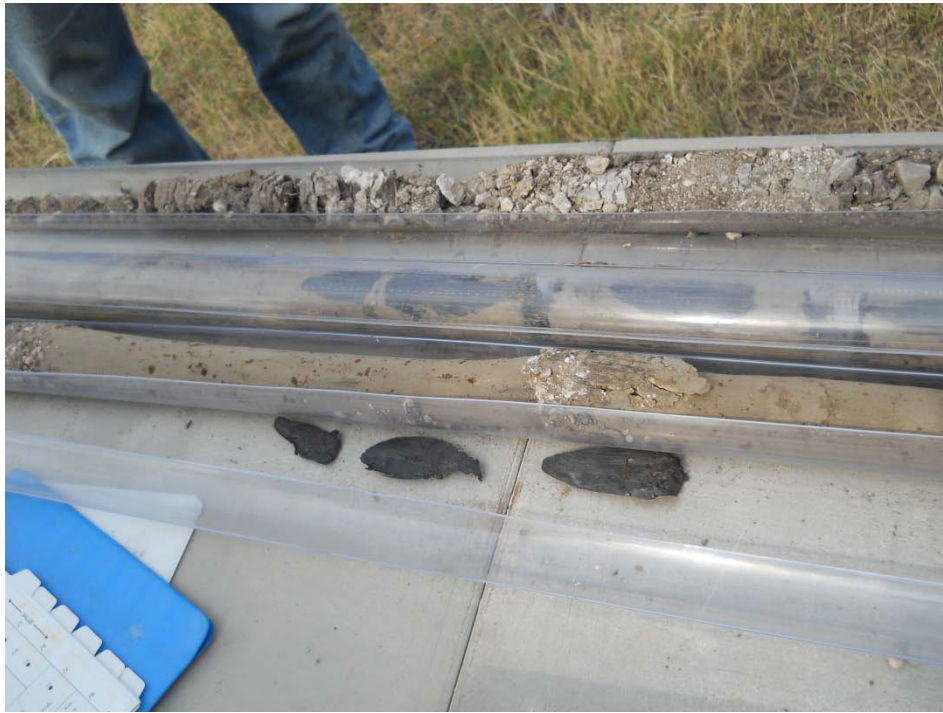
Photograph No. 33

Description: NMW-1. Surface sampling.



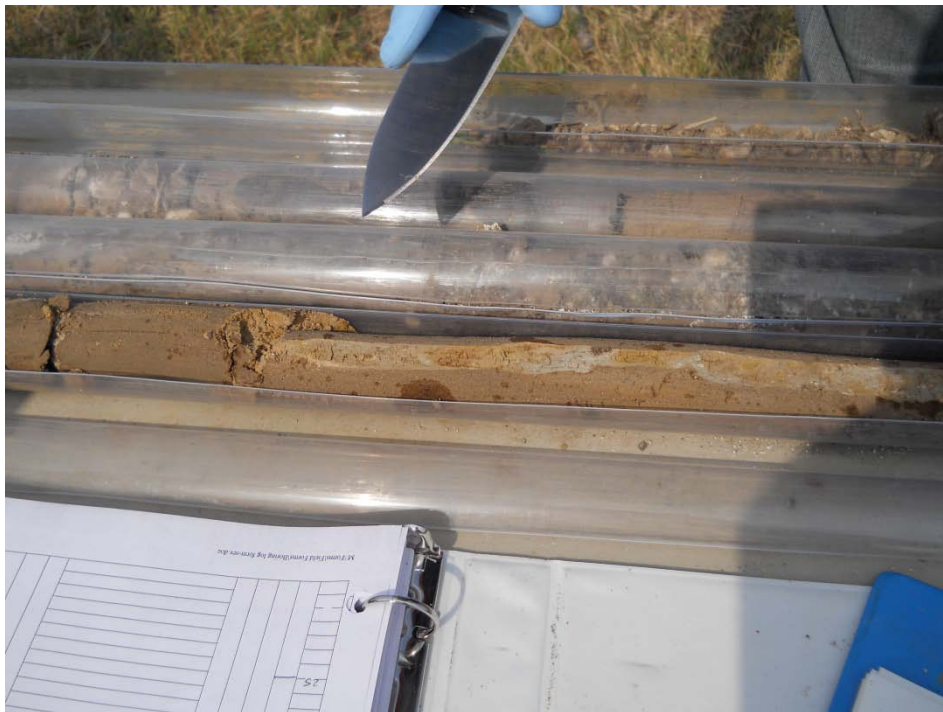
Photograph No. 34

Description: NMW-1. Oil staining on 10-15' core interval.



Photograph No. 35

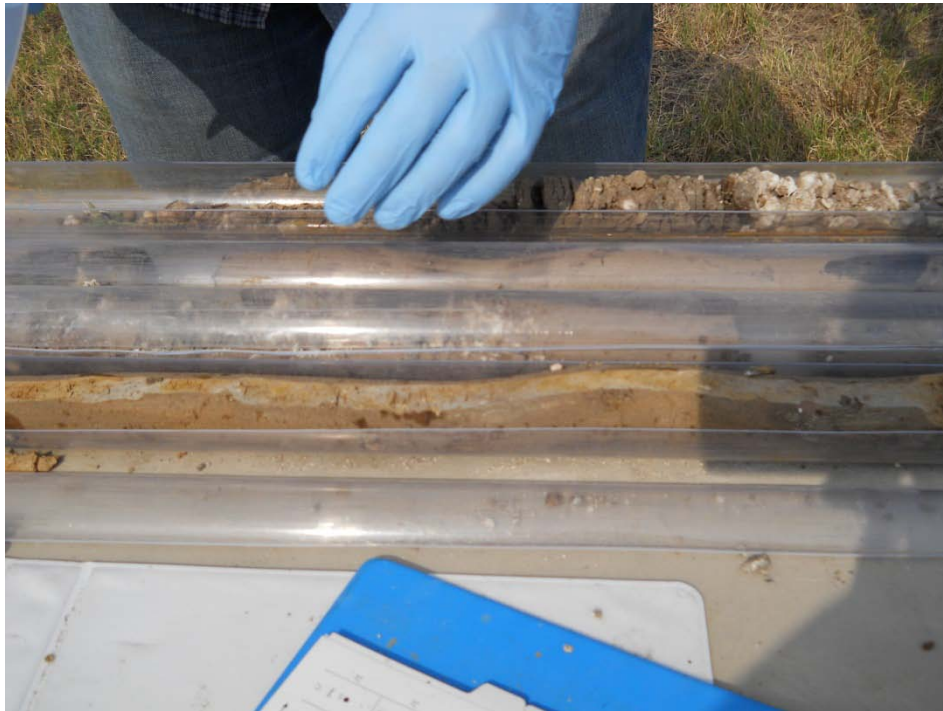
Description: NMW-1. Oil staining on 10-15' core interval.



Photograph No. 36

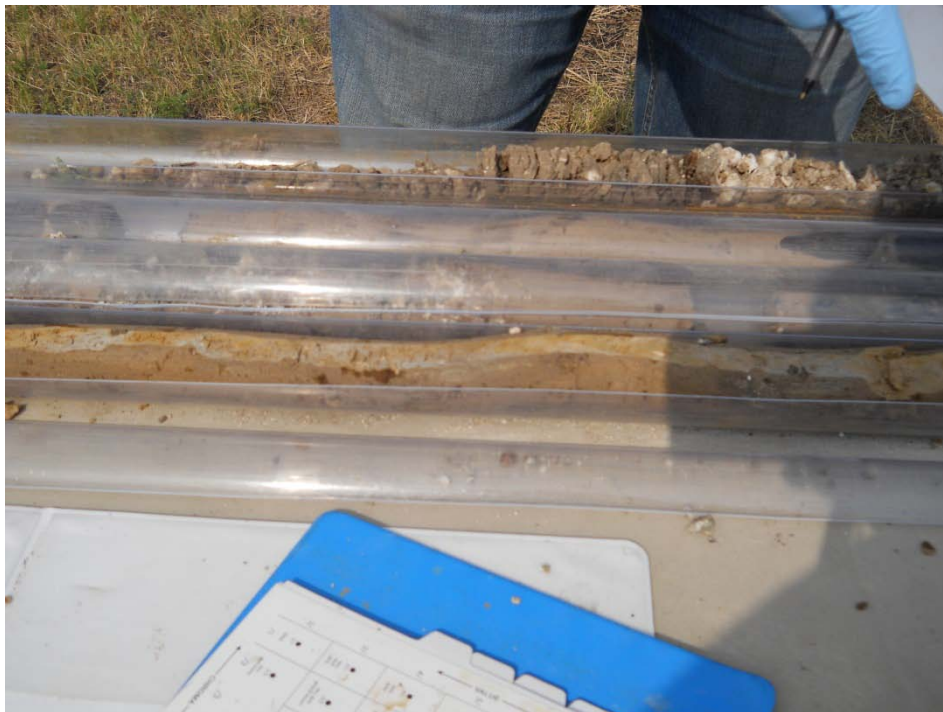
Description: NMW-1. Staining on 15-20' core interval.





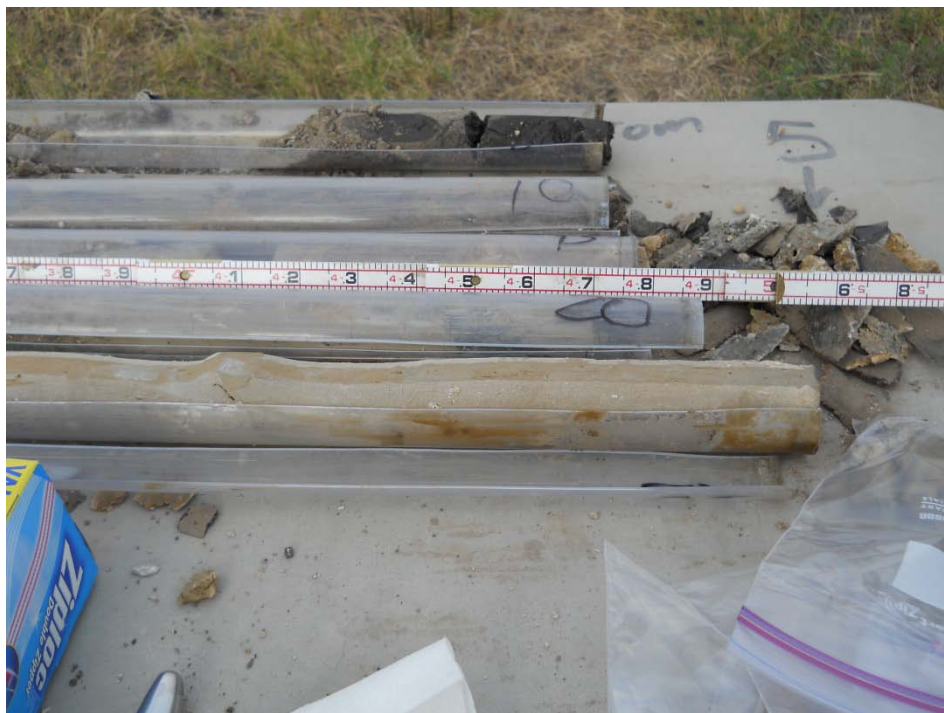
Photograph No. 37

Description: NMW-1. Staining on 15-20' core interval.



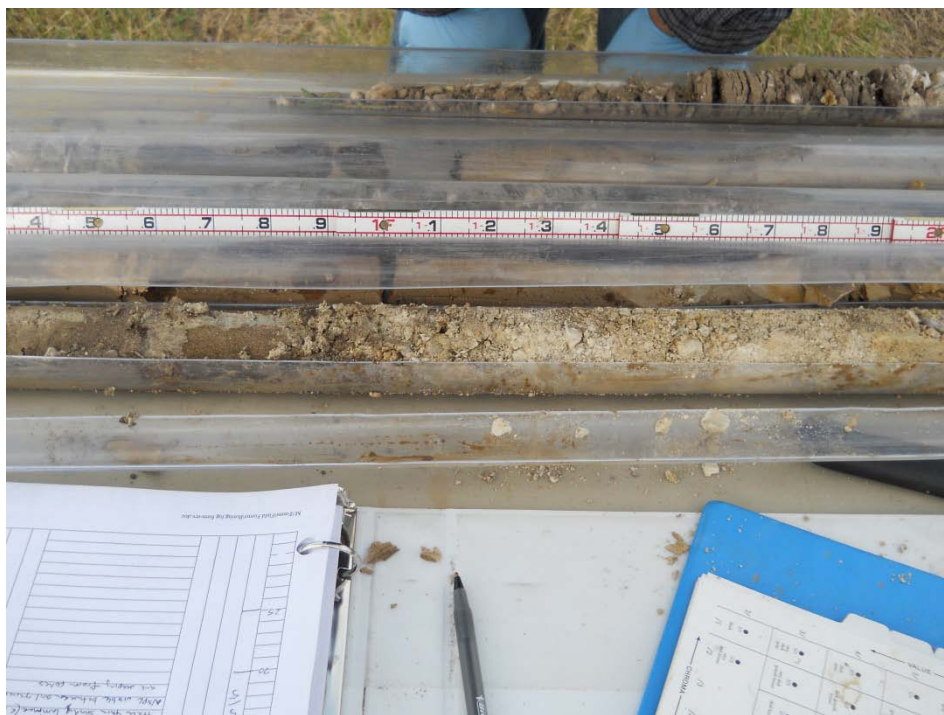
Photograph No. 38

Description: NMW-1. Staining on 15-20' core interval.



Photograph No. 39

Description: NMW-1. Staining in 20-25' core interval.



Photograph No. 40

Description: NMW-1. Gravel in 20-25' core interval.





Photograph No. 41

Description: MW-16. Stake.



Photograph No. 42

Description: MW-16. Surface sample.





Photograph No. 43

Description: MW-16. Setting up geoprobe.



Photograph No. 44

Description: MW-16. Acetate liner.



Photograph No. 45

Description: MW-16. Decontaminating the inside of geoprobe rods.



Photograph No. 46

Description: MW-16. Decontaminating the inside of geoprobe rods.





Photograph No. 47

Description: MW-16. Collecting soil samples for PID every 2'.



Photograph No. 48

Description: MW-16. Decontamination.



Photograph No. 49

Description: MW-16. Core.



Photograph No. 50

Description: MW-16. Core.





Photograph No. 51

Description: MW-16. Core, wet at 18'.



Photograph No. 52

Description: MW-16. Core, possible staining 20-25' interval.





Photograph No. 53

Description: MW-16. PID and LEL meters measuring the breathing zone.



Photograph No. 54

Description: MW-16. Terra core sampling.





Photograph No. 55

Description: MW-16. Plugging borehole.



Photograph No. 56

Description: Decontamination area.





Photograph No. 57

Description: MW-13. Stake.



Photograph No. 58

Description: MW-13. Surface sample.





Photograph No. 59

Description: MW-13. Geoprobeing.



Photograph No. 60

Description: MW-13. Sample, black wet oil sludge 0-5'.



Photograph No. 61

Description: MW-13. Sample, black wet oil sludge 0-5'.



Photograph No. 62

Description: MW-13. Sample, black wet oil sludge 0-5'.





Photograph No. 63

Description: MW-13. Core.



Photograph No. 64

Description: MW-13. Sample collection from approximately 4' bgs.





Photograph No. 65

Description: MW-13. Preparation for geoprobing.



Photograph No. 66

Description: MW-13. Top of 5-10' core interval.



Photograph No. 67

Description: MW-13. Middle of 5-10' core interval.



Photograph No. 68

Description: MW-13. Middle of 5-10' core interval.





Photograph No. 69

Description: MW-13. Core.



Photograph No. 70

Description: MW-13. Core.





Photograph No. 71

Description: MW-13. Core.



Photograph No. 72

Description: MW-13. Water and possible oil.



Photograph No. 73

Description: MW-13. Measuring headspace with PID.



Photograph No. 74

Description: MW-13. Soil sample collection.





Photograph No. 75

Description: Decontaminating sampling knives.



Photograph No. 76

Description: NMW-2. Stake.





Photograph No. 77

Description: NMW-2. Clearing location for surface sampling.



Photograph No. 78

Description: NMW-2. Decontaminating geoprobe rods.





Photograph No. 79

Description: NMW-2. Setting up PID and LEL meters.



Photograph No. 80

Description: NMW-2. Core 0-5'.



Photograph No. 81

Description: NMW-2. Black mottling and black oil staining 0-5'.



Photograph No. 82

Description: NMW-2. Black mottling and black oil staining 0-5'.





Photograph No. 83

Description: NMW-2. Core.



Photograph No. 84

Description: NMW-2. Core.



Photograph No. 85

Description: NMW-2. Core, interval in front is 20-25'.



Photograph No. 86

Description: NMW-2. Core.





Photograph No. 87

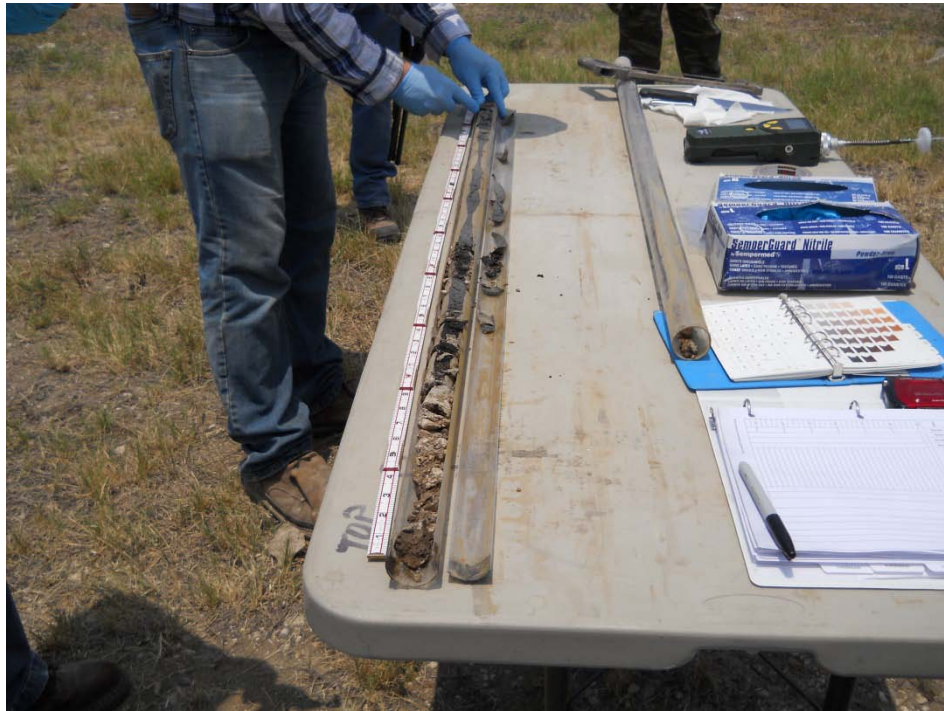
Description: NMW-2. Plugging borehole.



Photograph No. 88

Description: MW-15. Stake.





Photograph No. 89

Description: MW-15. Core 0-5'.



Photograph No. 90

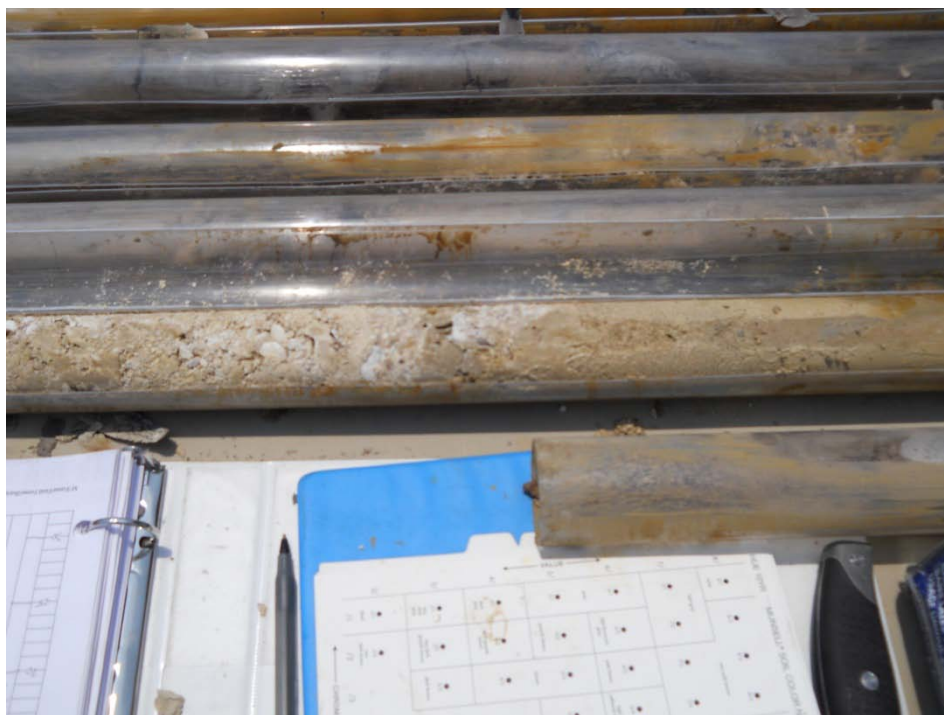
Description: MW-15. Black staining 15-20'.





Photograph No. 91

Description: MW-15. Core.



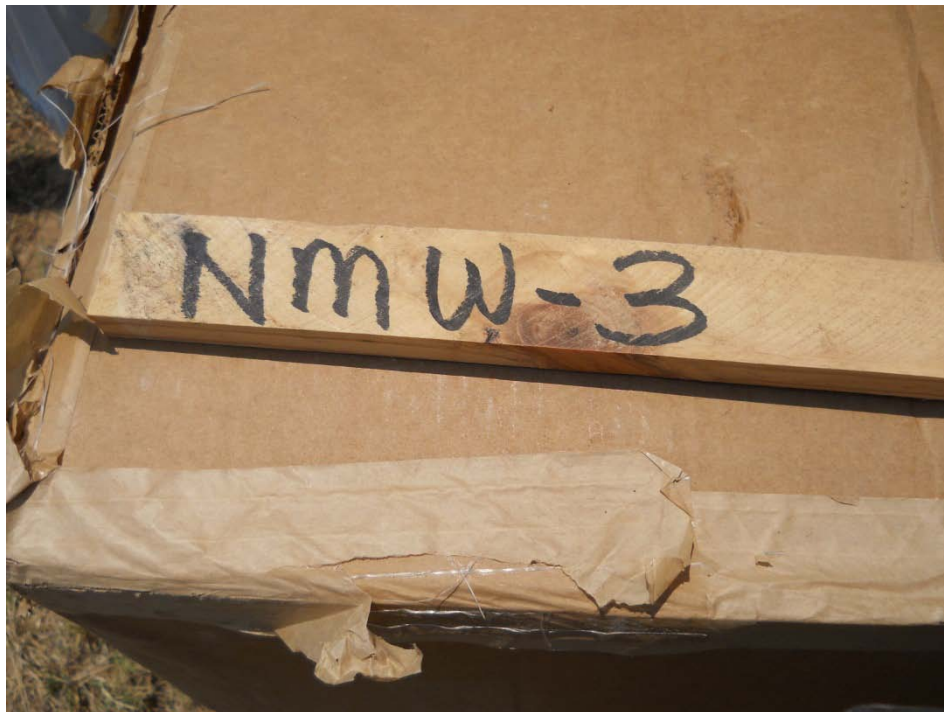
Photograph No. 92

Description: MW-15. Core, gravel 20-25'.



Photograph No. 93

Description: MW-15. Core.



Photograph No. 94

Description: NMW-3. Stake.





Photograph No. 95

Description: NMW-3. Geoprobe setup.



Photograph No. 96

Description: NMW-3. Core 0-5'.



Photograph No. 97

Description: NMW-3. Core 0-5'.



Photograph No. 98

Description: NMW-3. Core 0-5'.





Photograph No. 99

Description: NMW-3. Core 0-5'.



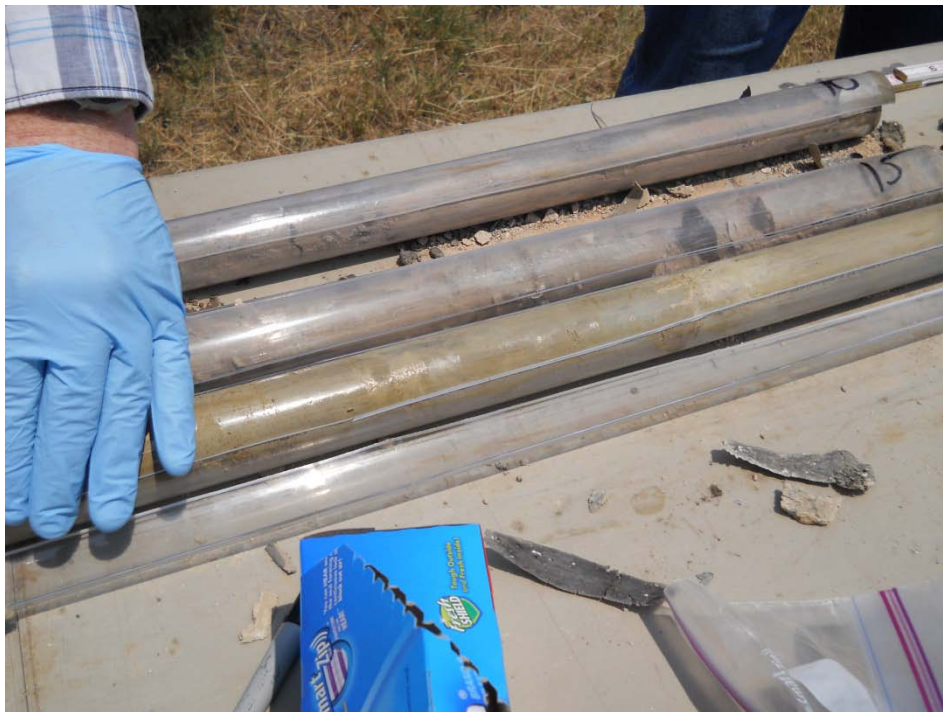
Photograph No. 100

Description: NMW-3. Core, taking samples for PID readings.



Photograph No. 101

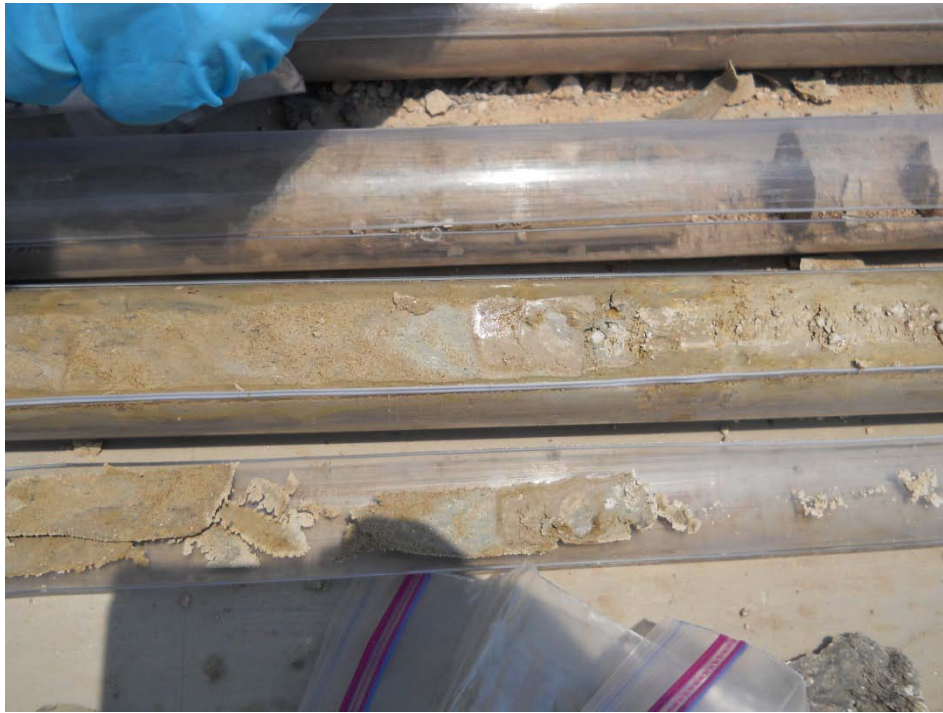
Description: NMW-3. Core 5-10'.



Photograph No. 102

Description: NMW-3. Core, possible staining 10-15'.





Photograph No. 103

Description: NMW-3. Core, possible staining 10-15'.



Photograph No. 104

Description: NMW-3. Core, possible staining 10-15'.



Photograph No. 105

Description: NMW-3. Core 20-25' interval.



Photograph No. 106

Description: NMW-3. Soil sampling.





Photograph No. 107

Description: NMW-3. Soil sampling.



Photograph No. 108

Description: MW-15. Plugged.





Photograph No. 109

Description: MW-17. Stake.



Photograph No. 110

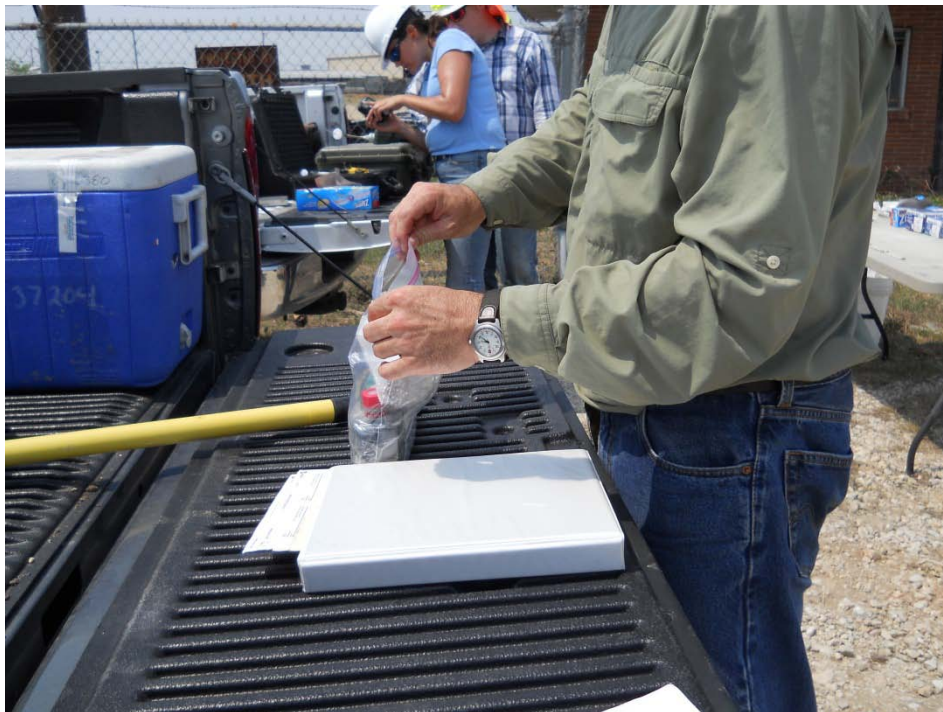
Description: MW-17. Stake.





Photograph No. 111

Description: MW-17. Setting up geoprobe.



Photograph No. 112

Description: MW-17. Surface soil sample.





Photograph No. 113

Description: MW-17. Geoprobng.



Photograph No. 114

Description: MW-17. Geoprobng.





Photograph No. 115

Description: MW-17. Geoprobeing.



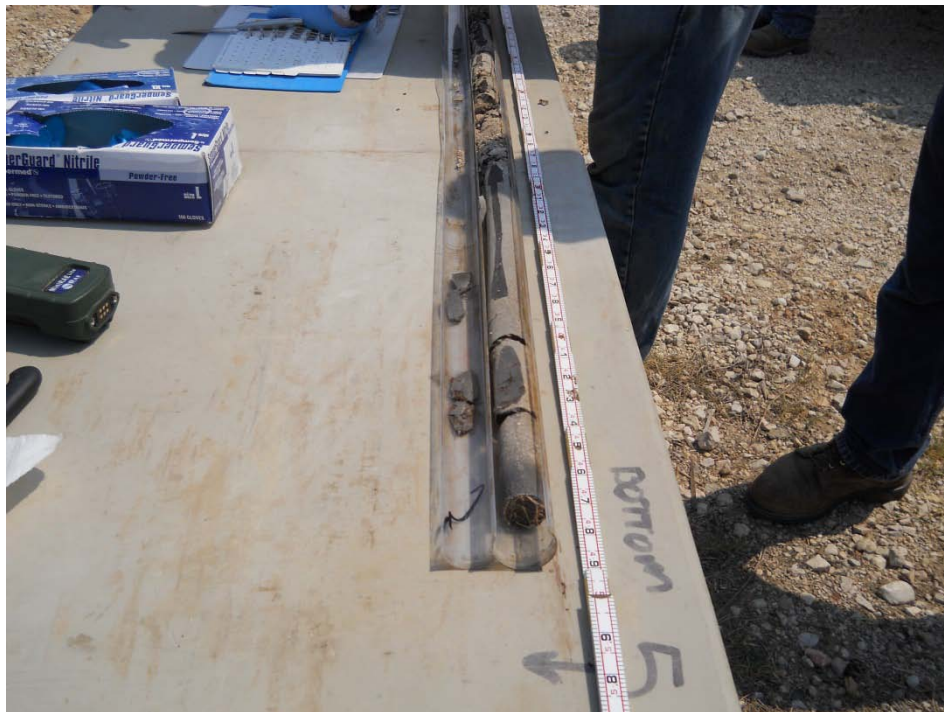
Photograph No. 116

Description: MW-17. Geoprobeing.



Photograph No. 117

Description: MW-17. Core 0-5'.



Photograph No. 118

Description: MW-17. Core 0-5'.





Photograph No. 119

Description: MW-17. Core.



Photograph No. 120

Description: MW-17. Core.



Photograph No. 121

Description: MW-17. Hydrocarbon staining at 15-20' interval.



Photograph No. 122

Description: MW-17. Core.





Photograph No. 123

Description: MW-17. Core, gravel at 20-25' interval.



Photograph No. 124

Description: MW-17. Core, gravel at 20-25' interval.





Photograph No. 125

Description: MW-17. Plugging borehole.



Photograph No. 126

Description: MW-17. Plugging borehole.





Photograph No. 127

Description: MW-19. Stake.



Photograph No. 128

Description: MW-19. Surface soil sample.





Photograph No. 129

Description: MW-19. Geoprobeing.



Photograph No. 130

Description: MW-19. Core, 0-5'.





Photograph No. 131

Description: MW-19. Core, 0-5'.



Photograph No. 132

Description: MW-19. Core.



Photograph No. 133

Description: MW-19. Sampling soil.



Photograph No. 134

Description: MW-19. Wet, possible sheen observed at 15-20' interval.





Photograph No. 135

Description: MW-19. Core, wet at 20-25' interval.



Photograph No. 136

Description: MW-19. Core.





Photograph No. 137

Description: MW-19. Core.



Photograph No. 138

Description: MW-19. Borehole plugged.





Photograph No. 139

Description: NMW-5. Stake.



Photograph No. 140

Description: NMW-5. Surface sample.





Photograph No. 141

Description: NMW-5. Core 0-5'.



Photograph No. 142

Description: NMW-5. Core.





Photograph No. 143

Description: NMW-5. Core.



Photograph No. 144

Description: Decontamination.





Photograph No. 145

Description: NMW-5. Core.



Photograph No. 146

Description: NMW-5. Core.





Photograph No. 147

Description: NMW-4. Stake.



Photograph No. 148

Description: NMW-4. Surface sampling.





Photograph No. 149

Description: NMW-4. Geoprobeing.



Photograph No. 150

Description: NMW-4. Geoprobeing.





Photograph No. 151  
Description: NMW-4. Geoprobeing.



Photograph No. 152  
Description: NMW-4. Geoprobeing.



Photograph No. 153

Description: NMW-4. Table set up for looking at samples.



Photograph No. 154

Description: NMW-4. Core 0-5'.





Photograph No. 155

Description: NMW-4. Core 0-5'.



Photograph No. 156

Description: NMW-4. Staining on 5-10' core interval.



Photograph No. 157

Description: NMW-4. Staining on 5-10' core interval.



Photograph No. 158

Description: NMW-4. Core.





Photograph No. 159

Description: NMW-4. Core, hydrocarbon staining at 15-20' core interval.



Photograph No. 160

Description: NMW-4. Core.



Photograph No. 161

Description: NMW-4. Core.



Photograph No. 162

Description: NMW-4. Core.





Photograph No. 163

Description: NMW-4. Core, gravel at 20-25' interval.



Photograph No. 164

Description: NMW-4. Core, gravel at 20-25' interval.



Photograph No. 165

Description: NMW-4. Core, gravel at 20-25' interval.



Photograph No. 166

Description: NMW-4. Plugging borehole.





Photograph No. 167

Description: NMW-4. Core.



Photograph No. 168

Description: NMW-4. Sample collection.



Photograph No. 169

Description: MW-18. Hollow stem auger drilling.



Photograph No. 170

Description: MW-18. Drilling for monitor well installation.





Photograph No. 171

Description: MW-18. Installing well casing.



Photograph No. 172

Description: MW-18. Setting filter pack in well annulus.





Photograph No. 173

Description: MW-18. Well installation.



Photograph No. 174

Description: MW-18. Well installation.





Photograph No. 175

Description: MW-18. Setting filter pack.



Photograph No. 176

Description: MW-18. Removing auger.





Photograph No. 177

Description: MW-18. Setting filter pack.



Photograph No. 178

Description: MW-18. Setting bentonite chips for the seal.





Photograph No. 179

Description: MW-18. Mixing cement for well pad.



Photograph No. 180

Description: MW-18. Well installation.





Photograph No. 181

Description: MW-18. Completing the well.



Photograph No. 182

Description: MW-18. Well stick-up.





Photograph No. 183

Description: MW-18. Well stick-up.



Photograph No. 184

Description: MW-14. Drilling.





Photograph No. 185

Description: MW-14. Well installation.



Photograph No. 186

Description: MW-14. Well installation.





Photograph No. 187

Description: MW-14. Well installation.



Photograph No. 188

Description: MW-14. Well installation.





Photograph No. 189

Description: MW-14. Well installation.



Photograph No. 190

Description: MW-14. Well installation.





Photograph No. 191

Description: MW-14. Well installation.



Photograph No. 192

Description: MW-12. Drilling.





Photograph No. 193

Description: MW-12. Plugging geoprobe borehole.



Photograph No. 194

Description: MW-12. Drilling.





Photograph No. 195

Description: MW-12. Drilling.



Photograph No. 196

Description: Decontaminating augers.





Photograph No. 197

Description: Decontaminating augers.



Photograph No. 198

Description: MW-12. Drilling.





Photograph No. 199

Description: MW-12. Hydraulic leak on drilling rig.



Photograph No. 200

Description: MW-12. Drilling.





Photograph No. 201

Description: MW-12. Drilling.



Photograph No. 202

Description: MW-12. Cuttings.





Photograph No. 203

Description: MW-12. Cuttings.



Photograph No. 204

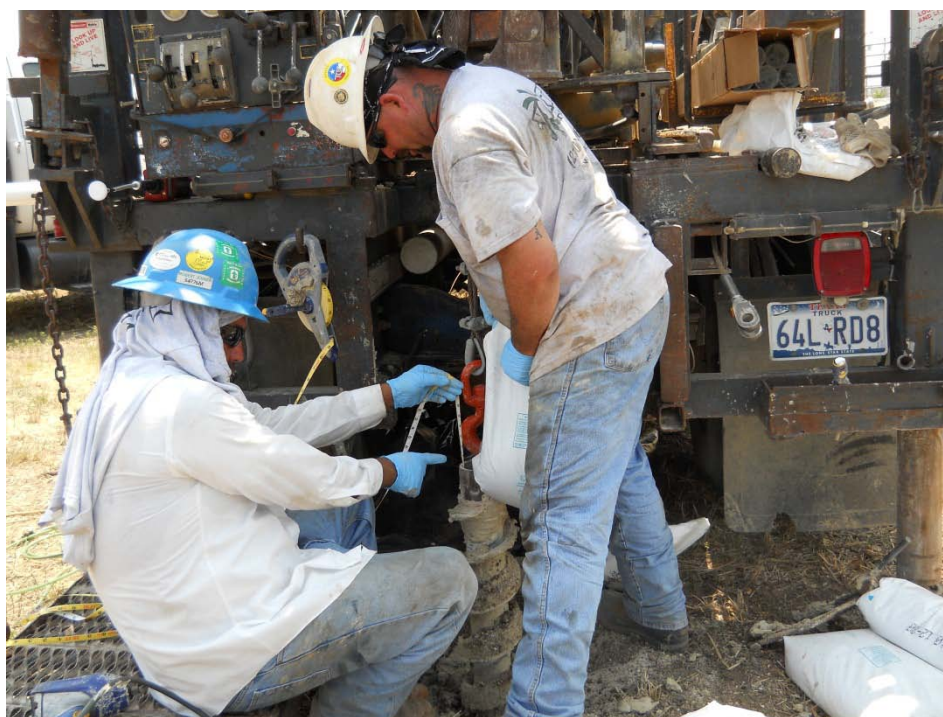
Description: MW-12. Drilling.





Photograph No. 205

Description: MW-12. Cuttings.



Photograph No. 206

Description: MW-12. Adding filter pack.





Photograph No. 207  
Description: MW-12. Adding filter pack.

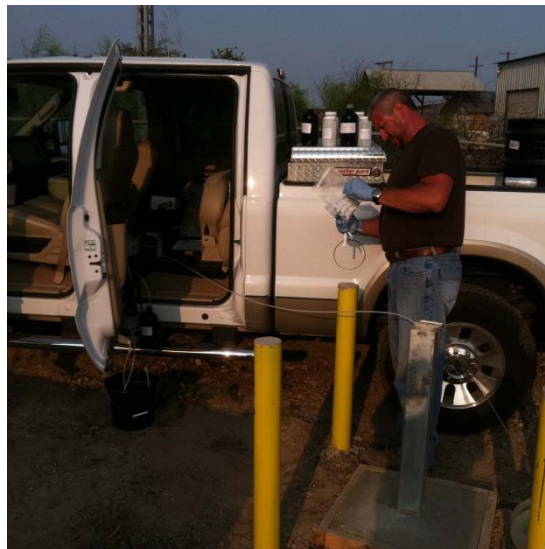


Photograph No. 208  
Description: MW-6. PBW performing LNAPL sampling.



Photograph No. 209

Description: MW-13. Low-flow sampling set up.



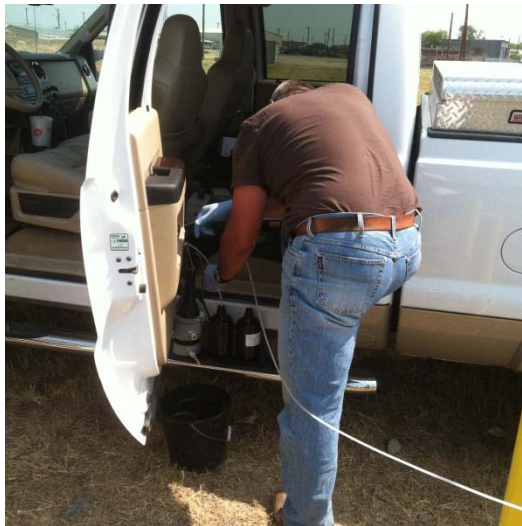
Photograph No. 210

Description: MW-12. PBW sampling.

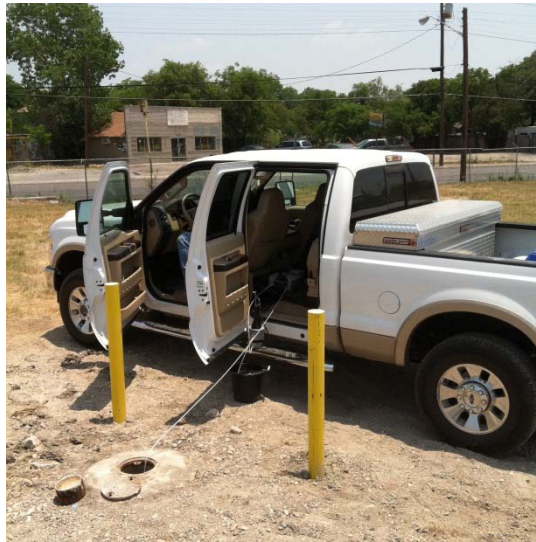




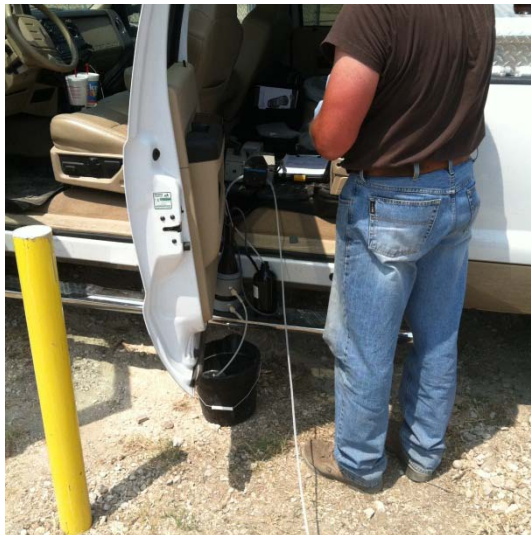
Photograph No. 211  
Description: MW-1. PBW sampling.



Photograph No. 212  
Description: MW-2. PBW sampling.



Photograph No. 213  
Description: MW-5. PBW sampling set up.



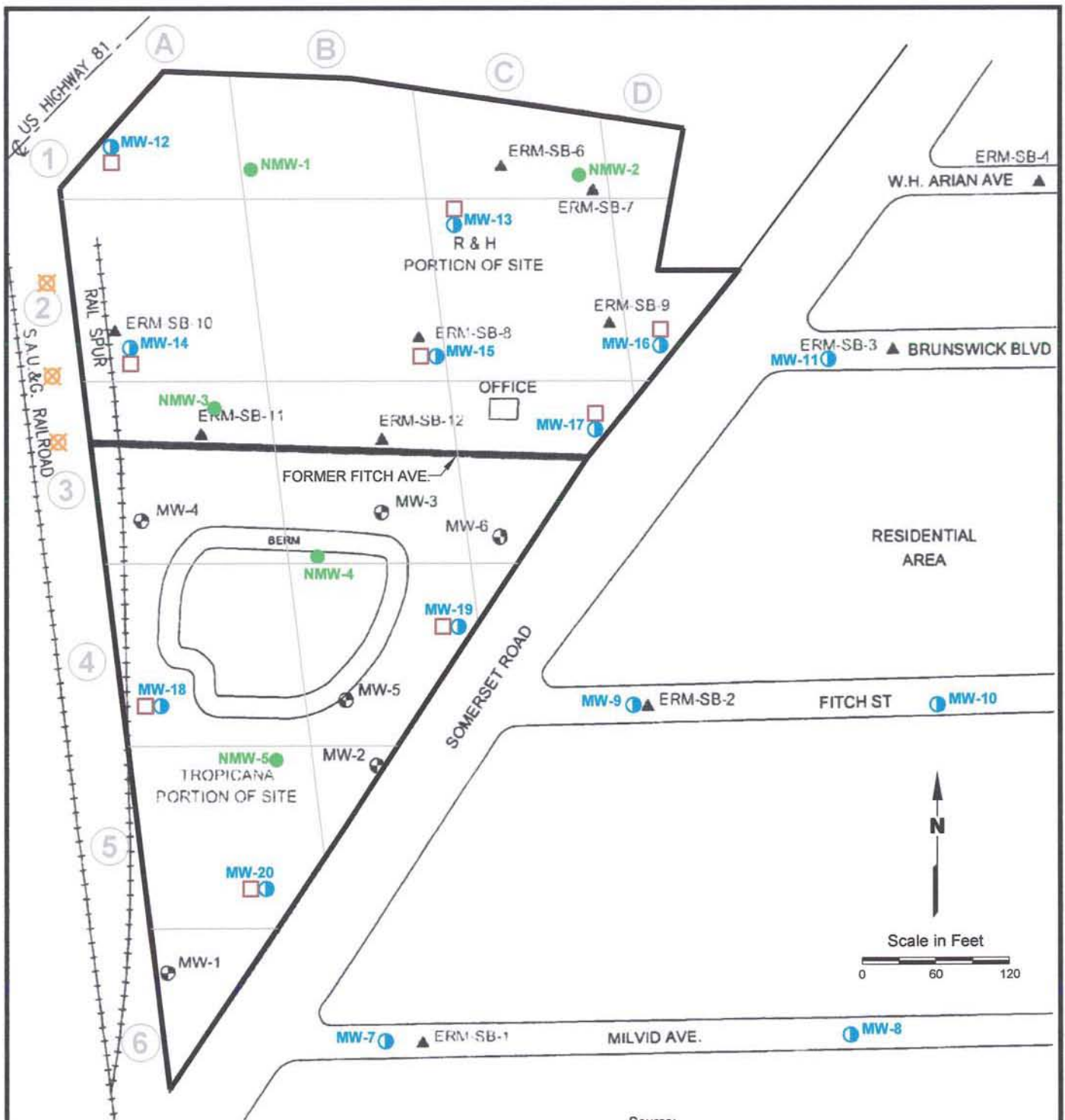
Photograph No. 214  
Description: MW-3. PBW sampling.



**ATTACHMENT 4**

**WELL LOCATION MAP**

**from PRP Field Sampling Plan by Pastor, Behling, and Wheeler**



#### EXPLANATION

- Approximate Site Boundary
- ▲ Previous Soil Boring/Temporary Well Location
- Existing Groundwater Monitoring Well Location
- ① RI/FS Soil Boring/Groundwater Monitoring Well Location
- RI/FS Soil Boring/NAPL Monitoring Well Location
- RI/FS Soil Gas Sample Location
- ⊠ Ditch Surface Water Sample Location (upstream sample locations to be determined at time of sampling).

#### Notes:

1. All locations are approximate.
2. RI/FS locations subject to modification based on field conditions.
3. Test pit locations will be determined based on soil boring and monitoring well data, and thus are not shown on this figure.

#### Source:

Base map from Engineering Management Support, Inc. Site Map dated September 2004.

#### R&H OIL/TROPICANA ENERGY SITE

Figure 3

### PROPOSED RI/FS SAMPLE LOCATIONS

PROJECT: 1589

BY: ZGK

REVISIONS

DATE: SEPT., 2010

CHECKED: EFP

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS